Chapter 3
Affected Environment

3.1 Introduction

This chapter describes the environment potentially affected by construction, operation and maintenance of the proposed Harry Allen–Mead 500kV Transmission Line (Proposed Action). The Proposed Action is described in detail in Chapter 2. Potential resource impacts from the Proposed Action and suggested mitigating measures are described in Chapter 4.

The Affected Environment resource sections discuss the conditions in the human, natural and cultural environments that could be affected, directly or indirectly and beneficially or adversely from the construction, operation and maintenance of the Proposed Action. Resources to be included in the environmental studies were identified through internal and external scoping. Key resources include the following:

- Biological (botanical, noxious weeds, wildlife and special-status species)
- Air
- Visual
- Cultural and Ethnographic

In addition to these key resources, other environmental elements were identified as potentially affected by or affecting the Proposed Action and were also assessed:

- Land Use
- Socio Economics
- Public Safety (electric and magnetic fields, hazardous materials)
- Water
- Geology and Soils
- Paleontological Resources

Study corridor widths varied by resource and are identified within each inventory methods section. Refer to the resource maps in Appendix A for more information regarding the location and size of study corridors.

3.2 General Plan Setting

The proposed project follows a route approximately 48 miles south from an area northeast of the Apex Industrial Park, located approximately 15 miles northeast of Las Vegas, Nevada, to near Boulder City, Nevada (Refer to Appendix A, Map 1: Proposed Alignment). The proposed project falls entirely within Clark County and is a mixture of Federal and state public lands and private property. The proposed project also crosses the cities of Henderson, Boulder City and Las Vegas. Public land administered by the Bureau

of Land Management (BLM) is located throughout the plan area. Other public lands within the plan area are managed by the United States Bureau of Reclamation (USBR), Western Area Power Administration (Western), University of Nevada, Las Vegas (UNLV) and Clark County.

3.3 Key Resources

3.3.1 Botanical Resources

Introduction

The botanical resources of the plan area are classified as either sensitive or non-sensitive species. Federal and state governments protect many of these resources. The U.S. Fish and Wildlife Service (FWS) maintains the list of species protected by the Endangered Species Act. This list classifies species that are endangered, threatened, proposed threatened and candidate by the FWS. Plants protected by the Nevada Division of Forestry (NDF) are considered state sensitive by BLM. A letter was received from FWS on March 12, 2003 (File No. 1-5-03-SP-478) identifying federally listed species and Nevada species of concern that may be present within the proposed project area. The list of threatened, endangered and candidate species within the project area had not changed as of September 18, 2003 (LaVoie, September 2003, Personal Communication).

Botanical Inventory Methods

Botanical surveys in the plan area, including field surveys conducted in spring/summer 2002 and previous surveys for projects in the immediate and adjacent areas (Knight & Leavitt 2001, 2003), were used for this analysis. The 2002 surveys were conducted within a one-half-mile-wide corridor.

The Multi-Species Habitat Conservation Plan (MSHCP) was reviewed to identify species with the potential for being affected by the Proposed Action (FWS, 2001). As signatories to the MSHCP, the BLM is committed to managing affected species by developing protective measures to minimize impacts to species from human activities and to ensure long-term conservation to prevent future listing.

Technical information was requested from the Nevada Natural Heritage Program database (NNHP, 2002). The results were used to develop information on the botanical resources in the plan area. Other data sources used were previous studies for Nevada Power (Knight & Leavitt, 2001) and BLM management plans for the plan area.

Data from the NNHP were plotted onto 7.5-minute topographic maps. Vegetation communities, cover types and special status species information can be found on Map 2: Biological Resources in Appendix A. In addition, gypsum soils are shown on the map to indicate potential areas for gypsum-associated plants.

Botanical Inventory Results

General Description of Plan Area

Typically, the plan area has hot, dry summers and cool, dry winters. Rainfall is less than five inches per year. Topography in the vicinity of the plan area varies with features such as alluvial fans, sand blown flats, badlands, desert pavements, limestone and volcanic rock bluffs bisected by a large number of ephemeral drainages. Much of the plan area from milepost 14 south to the Mead Substation has gypsiferous soils, which are known to provide potential habitat for a suite of gypsum endemic plants including Las Vegas bearpoppy and sticky ringstem.

Much of the plan area has vegetation typical of the lower elevations of the Mojave Desert. The flora and communities of the lower Mojave Desert are characterized by great diversity, and only half of its 545 plant species also occur in the Sonoran Desert (Vasek and Barbour 1990). Vegetation types collectively referred to as Mojave Desert scrub include: creosotebush scrub, saltbush scrub, shadscale scrub, blackbrush scrub, Joshua-tree woodland and annual vegetation.

The only riparian plants occurring in the plan area are closely associated with the Las Vegas Wash. The dominant riparian plant species identified in this area was saltcedar (*Tamarisk ramosissima)*. Saltcedar is a noxious wetland species that can grow from from 5 to 20 feet tall. Seedlings establish in soils that are seasonally saturated. Refer to Map 2: Biological Resources in Appendix A for the location of these riparian plants.

Plant communities located in the smaller washes included desert willow (*Chilopsis lenearis*) and cheese weed (*Hymenoclea salsola*). Cacti such as strawberry hedgehog (*Echinocereus engelmannii*) and beavertail cactus (*Opuntia basilaris*) were also present in some of the drainages.

Species of Concern

While the list obtained from FWS identified that no listed threatened, endangered or candidate plant species occur in the plan area, there are several species of concern that have the potential to occur in the plan area. Species of concern is a term that refers to those species the FWS believes might be in need of concentrated conservation actions. A species may also be considered state sensitive or protected by the BLM and NDF. Nevada state protected species are categorized by NDF as 1) critically endangered, 2) recommended for listing as critically endangered, or 3) protected as a cactus, yucca or Christmas tree. The BLM also considers any plants given special status by the MSHCP as sensitive. Table 3-1 lists the plant species of concern with the potential to be located in the plan area along with the corresponding Federal and state protection status.

Table 3-1 Plant Species of Concern That May Occur Within the Plan Area

Species of Concern	Common Name	BLM Status	NDF State Status	FWS Status	MSHCP Status
Anulocaulis leioselinus	sticky ringstem	none	none	none	covered
Arctomecon californica	Las Vegas bearpoppy	special status-state sensitive	critically endangered	species of concern	covered

Species of Concern	Common Name	BLM Status	NDF State Status	FWS Status	MSHCP Status
Arctomecon merriamii	white bearpoppy	special status	none	species of concern	covered
Astragalus geyeri var. *triquetrus*	threecorner milkvetch	special status-state sensitive	critically endangered	species of concern	covered
Astragalus nyensis	Nye milkvetch	special status	none	species of concern	none
Calochortus striatus	alkali mariposa lily	special status	none	species of concern	covered
Cryptantha insolita	Las Vegas catseye	special status-state sensitive	critically endangered/extinct	species of concern	evaluation-medium
Eriogonum corymbosum var. glutinosum	Las Vegas buckwheat	special status-state sensitive	*nominated as critically endangered	species of concern	none
Opuntia whipplei var. multigeniculata	blue diamond cholla	special status-state sensitive	critically endangered	species of concern	covered
Pediomelum castoreum	beaver dam breadroot	special status	none	species of concern	watch list
Penstemon bicolor ssp. *roseus*	rosy two-tone penstemon, rosy two-tone beardtongue	special status-state sensitive	critically endangered	species of concern	watch list
Penstemon bicolor ssp. *bicolor*	yellow two-tone penstemon, yellow two-tone beardtongue	special status	none	candidate species	watch list
Perityle intricata	delicate rock daisy	special status	none	species of concern	none
Phacelia parishii	parish phacelia	special status	none	species of concern	covered

Sticky Ringstem (*Anulocaulis leioselinus)*

Sticky ringstem does not have BLM or NDF status nor does it have FWS status, but it is a MSHCP covered species. Sticky ringstem is a robust perennial herb to 1.5 meters tall, forming large clumps. Flowers are greenish-bronze on the tube and white or pale pink on the limb. In Nevada, this species has been found along the eastern edge of the Mojave Desert in Clark County. It is not known whether the Las Vegas population of sticky ringstem is taxonomically distinct from the widespread population that extends to Arizona and New Mexico (Knight and Leavitt, 2003). This species tends to occur on gypsiferous soils on rolling hills and terraces and is commonly associated with Las Vegas bearpoppy and other gypsophile plants. Areas of gypsum-impregnated soils encompass approximately 122 acres within the half-mile-wide plan area.

A total of 86 specimens of sticky ringstem were located during the summer and fall 2002 surveys for this project on the alignment from milepost 16.4 to 19.8. Sites were within the BLM Sunrise Management Area/Rainbow Gardens. Refer to Map 2: Biological Resources in Appendix A for locations of sticky ringstem and areas of gypsum soils, which may be potential habitat for this species. These areas are located throughout much of the plan area south of milepost 14.

Las Vegas Bearpoppy (*Arctomecon californica)*

Las Vegas bearpoppy is critically endangered according to BLM and NDF and a FWS species of concern. Las Vegas bearpoppy is a short-lived perennial wholly endemic to the Mojave Desert (mostly Clark County), where it grows on gypsiferous outcrops (BLM, 1998, 2000; Knight and Leavitt, 2003). Las Vegas bearpoppy grows with a suite of gypsum endemics including Las Vegas buckwheat, sticky ringstem and Palmer phacelia (*Phacelia palmeri*). At this time, none of the gypsum endemics are known to transplant successfully (100 percent mortality) or to germinate from seed.

Las Vegas bearpoppy specimens were located during summer and fall 2002 surveys in many of the same areas that sticky ringstem (above) was found, along the alignment from milepost 15.8 to 19.8. Gypsum soils, which indicates potentially suitable habitat for this species, are indicated on Map 2: Biological Resources in Appendix A

White Bearpoppy (*Arctomecon merriamii)*

White bearpoppy is identified as sensitive by the BLM and NDF and is a FWS species of concern. White bearpoppy is a perennial with short stems atop a stout taproot. This species flowers from April to early June. Its habitat includes salt desert scrub and Mojave Desert scrub. Populations are scattered over various habitats including limestone and dolomite ridges, rocky slopes, gravely canyon washes and less often on valley bottoms, disturbed sites such as roadsides and bladed areas and old lakebeds derived from carbonate rock sources. White bearpoppy is endemic to the Mojave Desert and is found in the western half of Clark County, distributed throughout a 9,650 square mile area, west of the plan area, between 2,000 and 6,200 feet (NNHP, 2001).

This species was not surveyed for during the 2002 survey. Based on data from the Nevada Natural Heritage Program, it is not likely to occur in the plan area.

Threecorner Milkvetch (*Astragalus geyeri* var. *triquetrus)*

Threecorner milkvetch is identified as critically endangered by the BLM and NDF. The FWS identified it as a species of concern. Threecorner milkvetch is an annual herb that is endemic to the eastern Mohave Desert. It grows in loose, sandy soils or stabilized sands, occasionally with a pebble cover. This species tends to appear in creosote bush scrub during springs with average or higher precipitation (Knight and Leavitt, 2003). It occurs from the northeastern portion of Clark County, in Sand Hollow Wash, Lincoln County and in Mohave County, Arizona (Niles et al., 1995). Previous surveys for the Harry Allen–Crystal 500kV Transmission Line EA identified specimens just north of the plan area in sandy soils midway between Harry Allen and Crystal substations (BLM, 2001). Additional habitat was identified between mileposts 19 and 21 of the plan area.

Threecorner milkvetch was not seen in the plan area during the 2002 survey. There was, however, lower than normal rainfall for the plan area during the survey year. As a result, this species could potentially be found during wetter years in the area between mileposts 19 and 21.

Nye Milkvetch (*Astragalus nyensis*)

Nye milkvetch is a slender, pubescent, annual herb originally collected in Nye County, Nevada but now thought to have a larger range (Knight and Leavitt, 2003). Its habitat is typical of outwash fans, gravelly flats and occasionally sandy soils. This species is known to occur with threecorner milkvetch, which has been identified from previous surveys in areas just north of the plan area. Habitat for threecorner milkvetch was also identified between mileposts 19 and 21 of the plan area.

Nye milkvetch was not seen in the plan area during the 2002 survey. However, like threecorner milkvetch, a lower than normal rainfall for the plan area could have impacted survey results.

Alkali Mariposa Lily (*Calochortus striatus)*

Alkali mariposa lily is sensitive according to the BLM and NDF and a species of concern for FWS. This perennial species flowers from April to June. The flowers have light purple petals striated with darker purple veins, with the lower half sparsely white and hairy. It is found growing in Mojave Desert scrub, restricted to alkaline meadows and mesic areas between 2,100 and 3,700 ft. in elevation (Recon, 2000). It is endemic to the western Mojave Desert in California and Nevada. In Clark County, this lily can be found in the Red Rock Canyon NCA, west of the plan area (Recon, 2000).

The alkali mariposa lily species was not surveyed for during the 2002 survey. No alkaline meadows occur within the plan area; therefore, it is unlikely to occur.

Las Vegas Catseye (*Cryptantha insolita)*

Las Vegas catseye, also known as unusual catseye, is identified as critically endangered by the BLM and NDF and a species of concern by FWS. This perennial herb blooms April-June. It normally occurs in light-colored, alkaline clay flats and rolling hillsides with creosote bush scrub at about 1,000 to 2,000 feet in elevation. It is known from only two collections made in 1905 and 1942. Both collections were made in the bajadas north of Las Vegas, Nevada.

This species has been searched for without success and it may now be extinct (NatureServe, 2002); therefore, the Las Vegas catseye was not surveyed for during the 2002 survey and is not likely to occur in the plan area.

Las Vegas Buckwheat (*Eriogonum corymbosum var. glutinosum)*

Las Vegas buckwheat, also known as golden buckwheat, has been nominated for critically endangered by the BLM and NDF (Nelson, BLM, personal communication, July 2003). It is also a FWS species of concern. Las Vegas buckwheat is a large, yellow-flowered shrub that flowers in the fall, typically in October. This species was previously assigned to the St. George, Utah, populations, where it was considered endemic (Reveal, 1995). Current studies show that the Las Vegas buckwheat is unique genetically and occurs in the North Las Vegas area, the White Basin area of the Muddy Mountains and the Gold Butte area (Nelson, BLM, Las Vegas Field Office, personal communication, August 2003). This same unique species might also occur in the extreme southern end of

Utah. In Clark County, Las Vegas buckwheat occurs on gypsiferous soils, or other unusual evaporite soils, frequently with Las Vegas bearpoppy.

This species was not surveyed for in 2002, but potential habitat of gypsum soils occurs throughout the plan area south of milepost 14 (refer to Map 2: Biological Resources in Appendix A).

Blue Diamond Cholla (*Opuntia whipplei var. multigeniculata)*

Blue diamond cholla is critically endangered according to BLM and NDF and a FWS species of concern. This species is thought to be endemic to the Blue Diamond Hills west of Las Vegas and was originally known from only one population there. Habitat for this species includes Mojave Desert scrub. Populations are restricted to dry limestone hills, underlain by gypsum, occurring mostly on north-facing slopes and exposed ridges. This cholla species forms part of a distinctive, unusual and rare plant community of succulent scrub. This community is characterized and dominated by a wide diversity of cactus, yucca and agave species.

This species was not identified during the 2002 surveys. Habitat in washes and loose rock slopes typically had little or no cacti and yucca species (Knight and Leavitt, 2003). Other species that were identified included silver cholla, buckthorn cholla and pencil cholla. Potential habitat may exist in the plan area, however this species is not likely to occur there given its limited known occurrences far to the west of the plan area.

Beaver Dam Breadroot (*Pediomelum castoreum)*

Beaver Dam breadroot has no BLM or NDF status, but it is a FWS species of concern. Beaver Dam breadroot is a low growing perennial herb that blooms from early April to mid-May and sets fruit by June. It grows in open sandy soils or sandy-clay soils in creosote bush scrub. Beaver Dam breadroot occurs from San Bernardino County, California through Clark County, Nevada to a narrow portion of Mohave County, Arizona. Beaver Dam breadroot is endemic to the Mojave Desert (Knight and Leavitt, 2003). This species has potential to occur with threecorner milkvetch.

This species was not surveyed for in 2002, but habitat was identified for threecorner milkvetch between mileposts 19 and 21, which could potentially provide habitat for this species.

Rosy Two-tone Penstemon (*Opuntia whipplei var. multigeniculata)*

Rosy two-tone penstemon is a proposed state sensitive species by BLM and NDF. The FWS status is species of concern. Rosy two-tone penstemon is a short-lived perennial that is wholly endemic to the Mojave Desert and widely occurs in Clark and Nye counties, Nevada and across the border into Arizona. This species flowers in April and prefers active wash channels comprised of calcareous gravels.

Rosy two-tone penstemon was not seen during the 2002 surveys, but it was suspected to occur given the 94 drainages identified as potential habitat within the plan area (Knight and Leavitt, 2003). Previous records indicated that the plants had been found within the plan area between milepost 0 and 6.0. Additional past sitings occurred between milepost 22 and 23 and between milepost 38 and 39.

Yellow Two-tone Penstemon (*Penstemon bicolor* ssp. *Bicolor)*

Yellow two-tone penstemon is identified as state sensitive by BLM and a FWS species of concern. Yellow two-tone penstemon is a perennial that is a probable endemic to Nevada and occurs in Clark County. This species is in decline with urban expansion of Las Vegas identified as a major threat. Flowers occur in April-May and like the rosy two-tone penstemon, this species prefers active wash channels comprised of calcareous gravels.

Yellow two-tone penstemon was not seen in 2002, but this species could occur in any of the 94 drainages identified as potential habitat for rosy two-tone penstemon.

Delicate Rock Daisy (*Perityle intricate)*

Delicate Rock Daisy has no BLM or NDF status but is a FWS species of concern. This species occurs at elevations of 2,620 to 6,000 feet in crevices and rubble of carbonate outcrops in the shadescale, blackbrush and mixed shrub zones (NNHP, 2001). It flowers in late spring to early fall.

The delicate rock daisy was not surveyed for during the 2002 survey. No individual plants or habitat is known to occur within the plan area.

Parish Phacelia (*Phacelia parishii)*

Parish phacelia is identified by BLM and NDF as state sensitive and by FWS as a species of concern. Parish phacelia occurs in salt desert scrub on alkaline playas and valley floors on lakebeds characterized by wet, heavy clay soils with excessive concentrations of soluble salts. It is generally found between 2,500 and 5,600 feet elevation. This species has been located at two locations in Clark County: Indian Springs Valley and Three Lakes Valley, both of these areas are located west of the plan area. A historic population in the Las Vegas Valley is apparently extirpated (NNHP, 2001).

This species was not surveyed for during the 2002 survey. No individual plants or habitat is known to occur within the plan area.

Cacti and Yucca

In Nevada, cacti and yucca (families Cactaceae and Agavaceae) and evergreen trees are protected by Nevada Revised Statues (NRS 527.060-.120). There is potential for cacti and yuccas to occur along the proposed alignment. Density and species vary tremendously along the corridor. Below the 2,300-foot contour, cacti and yuccas numbers tend to decrease rapidly. In some areas, cacti and yuccas are an insignificant part of the flora. Low cacti density is often due to the pressures of urban expansion, i.e. easy access to illegally remove this resource. Salvage of cacti and yucca is required by BLM.

During the 2002 field surveys, the following cacti and yucca species were identified in order of highest to lowest abundance: *Opuntia basilaris, Neolloydia johnsonii, Opuntia exhinocarpa, Opuntia acanthocarpa, Ferocactus acanthodes, Opuntia ramosissima, Yucca schidigera, Echinocereus engelmannii and Echinocactus polycephalus.*

3.3.2 Noxious Weeds

Introduction

Preventing the introduction and spread of noxious weeds is one objective of Integrated Weed Management Programs on BLM-administered lands throughout the United States, as directed under Executive Order 13112 – Invasive Species. The term "invasive species" is defined as an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health. The term "noxious weed" is defined as plants designated as noxious weeds by the Secretary of Agriculture or by the responsible State official.

Noxious weeds generally possess one or more of the following characteristics: aggressive and difficult to manage, poisonous, toxic, parasitic, a carrier or host of serious insects or disease, and new to or not common to the United States or parts thereof.

The Proposed Action may include clearing of land capable of supporting vegetation native to the plan area. The process of clearing these lands and the subsequent loss of native vegetation, although minimal, can make the area vulnerable to noxious weed invasions.

Noxious Weeds Inventory Methods

Information on noxious weeds that may occur in the vicinity of the plan area was obtained from the Clark County web site (http://www.co.clark.nv.us/comprehensive_planning/current/ Title30/ Appendices/ Title30_Appendix_C_Weeds.htm), the Nevada Weed Action Committee web site (http://www.agri.state.nv.us/nwac/NV_NoxWeeds.htm), Nevada's Coordinated Invasive Weed Strategy 2000 report (http://agri.state.nv.us/weed.pdf) and from Clark County Vector Control.

Noxious Weeds Inventory Results

Nevada's Coordinated Invasive Weed Strategy 2000 report listed those species having the "potential to cause the greatest impact on Nevada's ecosystem and economic well being." Most of these species are also included in the Nevada state list of noxious weeds.

Cheat grass (*Bromus tectorum*) and red brome (*Bromus rubens*) are common noxious weeds throughout the plan area and most parts of Southern Nevada. These species thrive where land has been stripped of its vegetation during land-disturbing activities.

Within riparian areas, tall whitetop (*Lepidium latifolium)*, also known as perennial pepperweed, is a concern in Nevada (Good, Nevada Cooperative Extension Service, personal communication, June 2003 and Hicks, Clark County Vector Control, personal communication, June 2003). This species occurs in the Las Vegas Wash within the plan area. Clark County Vector Control also finds and applies controls on saltcedar (*Tamarix* spp.) within the Las Vegas Wash.

Sahara mustard (*Brassica tournefortii*) is becoming a troublesome invasive in the southern Nevada area (Nelson, BLM, Las Vegas Field Office, personal communication, August 2003). Sahara mustard is a prolific seed producer invading roadsides and sandy

areas. These sandy areas are of concern because they tend to be habitat for many sensitive plant species. Since parts of the project area are within sandy areas that contain these sensitive species, BLM is very concerned about the spread of this invasive to those areas by this action.

3.3.3 Wildlife Resources

Introduction

The FWS maintains the list of species protected by the Endangered Species Act. This list classifies species that are endangered, threatened, proposed threatened and candidate by the FWS. Animals considered state sensitive are protected by the Nevada Division of Wildlife (NDOW) and are also considered sensitive by BLM. A letter was received from FWS on March 12, 2003 (File No. 1-5-03-SP-478) identifying federally listed species and Nevada species of concern that may be present within the proposed project area. The list of threatened, endangered and candidate species within the project area had not changed as of September 18, 2003 (LaVoie, September 2003, Personal Communication).

Wildlife Inventory Methods

Vegetation community mapping from the Clark County GIS, 2001 aerial imaging from the spatial information firm, HJW, Inc. and 40-foot topographic contour data were used as the basis for the wildlife habitat-based assessment of the transmission line plan area. Additionally, resource agency databases from the Nevada Natural Heritage Program (NNHP), the BLM and the Southern Nevada Field Office of the FWS were used. GIS data layers were mapped within the plan area and plotted on 1:12,000 scale maps for field-verification of the vegetation communities within the one-half-mile-wide study corridor for biological resources (See Appendix A, Map 2: Biological Resources).

Scientific literature, technical reports and resource agency databases were reviewed to assemble information regarding the biological resources of the plan area. Current data on the occurrence of sensitive species in the plan area were obtained from the NNHP, the Nevada Division of Wildlife (NDOW), Clark County MSHCP (FWS, 2000), the BLM and the Southern Nevada Field Office of the FWS.

Wildlife Inventory Results

U.S. Fish and Wildlife Service Threatened and Endangered Species

The FWS identified several threatened, endangered and candidate wildlife species potentially located within the plan area. Table 3-2 lists these species and identifies the corresponding protection status for the BLM, state of Nevada (NDOW) and MSHCP.

Table 3-2 Federally Listed and Candidate Wildlife Species That May Occur Within the Plan Area

Scientific Name	Common Name	Habitat	FWS Status	State/BLM Status	MSHCP Status
Gopherus agassizii	desert tortoise	Mojave desert scrub	threatened	threatened	covered
Empidonax traillii extimus	southwestern willow flycatcher	lowland riparian	endangered	protected	covered

Scientific Name	Common Name	Habitat	FWS Status	State/BLM Status	MSHCP Status
Haliaeetus leucocephalus	bald Eagle	mixed conifer, pinyon-juniper, sagebrush, lowland riparian and grassland habitats, usually close to large bodies of water, such as Lake Mead	threatened	protected	watch list
Rallus longirostris yumanensis	Yuma clapper rail	freshwater and brackish marshes, prefer dense cattails, bulrushes and other aquatic vegetation	endangered	protected	watch list
Coccyzus americanus	western yellow-billed cuckoo	riparian	candidate	protected	covered
Rana onca	relict leopard frog	desert riparian, springs	candidate	protected	covered

Desert Tortoise

The Mojave population of the desert tortoise is protected by the state of Nevada and was emergency listed by petition as endangered on October 13, 1989 and subsequently listed by the FWS as a threatened species on April 02, 1990 (55 FR 12178). Critical habitat was designated on February 08, 1994 (59 FR 5820). A recovery plan was completed and made available on June 28, 1994. A portion of the desert tortoise range within the project study area is covered under the programmatic biological opinions developed for tortoises inside (File No. 1-5-96-F-23R.AMD2) and outside (File No. 1-5-97-F-251) the Las Vegas Valley; however the project would disturb greater than the maximum acres allowed (240) for coverage under these biological opinions. A separate biological opinion will be rendered for this project, which will include all Federally-managed lands crossed by the project (BLM, USBR and Western).

The desert tortoise occurs on arid lands in association with low desert creosote bush scrub communities generally below 4,500 ft. Its preferred habitat includes scattered shrubs and a sufficient herbaceous understory layer to provide food and water needs. Tortoises can survive for a year without water (SNEI, 2003). When it rains, tortoises may form small depressions in the desert pavement to gather water. The desert tortoise occurs most often on flats and bajadas characterized by sandy to sandy-gravelly soils, but also on slopes and in rocky soils.

Tortoises are semi-fossorial, spending more than 90 percent of their life underground in burrows or pallets (SNEI, 2003). Burrows are between 2.5 and 10 feet in length and serve as a place to escape from the heat of the summer and a place of hibernation in the winter. This species is most active in the spring, primarily in late March until the beginning of the summer in June.

Dangers to the desert tortoise include Upper Respiratory Tract Disease (URTD), habitat loss, loss of forage plants to invading species, drought and vehicles, especially off-road vehicles (SNEI, 2003). A major threat to juvenile tortoises is predation by common ravens. Raven populations have increased considerably in recent years, probably caused by the rise in human population densities providing sources of food and water in otherwise barren areas (The Desert Tortoise Council, 2001).

The desert tortoise is expected to occur throughout the plan area with the exception of the highly urbanized areas. The density of tortoises in the plan area varies depending on location. Appendix A, Map 2: Biological Resources includes BLM data on tortoise densities in the plan area. Desert tortoise sign was observed throughout the project study area. Numerous tortoises with a range of age and size were observed, as well as other signs of tortoise including burrows, scat, carcasses and pallets.

Southwestern Willow Flycatcher

The southwestern willow flycatcher is state protected and was proposed for listing under the ESA on July 23, 1993 (58 FR 39495) and subsequently listed by the FWS as an endangered species on February 27, 1995 (60 FR 10693). There is no designated critical habitat in the proposed project area. A draft recovery plan for this species is currently under review.

The currently known breeding population for southwestern willow flycatcher is estimated to be between 300 and 500 pairs at about 75 sites throughout the southwest (Sogge, *et al,* 1997). This species lives in riparian habitat along rivers, streams, or other wetlands in dense growths of willows (*Salix* sp.), *Baccharis*, arrowweed (*Pluchea* sp.), buttonbush (*Cephalanthus* sp.), tamarisk (*Tamarix* sp.) and Russian olive (*Eleagnus* sp.), often with a scattered overstory of cottonwood (*Populus* sp.) (FWS, 2001). Throughout their range, these habitats tend to be rare and widely separated. Modification and loss of this habitat has endangered this species (Arizona Game and Fish, 2001). Brood parasitism by the brown-headed cowbird has also contributed to their decline (FWS, 2000). The southwestern willow flycatcher is an insectivore, foraging within and above dense riparian vegetation, taking insects on the wing or gleaning them from foliage.

This species arrives in North America between early May and early June to breed, then departs during late summer to spend the winter in Mexico, Central America and possibly northern South America (Sogge, *et al*, 1997). Degradation of wintering habitat may also be a factor in its decline. Migrating southwestern willow flycatchers may use non-riparian habitats. These migration stopover areas are not used for breeding; however, they may be critically important to local and regional flycatcher productivity and survival.

There is habitat appropriate for use by this species near the project area in the vicinity of the Las Vegas Wash. However, the constructed wetlands found in the Las Vegas Wash area have not been successful in attracting this species (Titus 2002). No southwestern willow flycatchers were found during Southern Nevada Environmental, Inc. (SNEI) surveys of the entire route in 2001 and 2002 nor was this species found during the 2003 survey of the Las Vegas Wash. However, in 2002, FWS protocol surveys conducted for an unrelated SNWA project detected two migrant flycatchers in the Las Vegas Wash survey area.

Bald Eagle

The bald eagle is currently listed by the FWS as a threatened species. Populations have recovered significantly in recent years and subsequently the FWS proposed removing the bald eagle from the Endangered Species List (64 FR 128).

Bald eagles nest in large trees or on cliffs adjacent to water. Their diet includes fish, waterfowl, small mammals and carrion. A pair of bald eagles nested the last two out of

three years at the Lahontan Reservoir near Fallon in northern Nevada. This is the first record of bald eagles nesting in Nevada in 100 years (Las Vegas Review Journal, 2002). There are no known bald eagle nests in southern Nevada (Tomlinson, personal communication, 2001).

During the winter, eagles often roost communally near large bodies of water. Bald eagles are known to winter at reservoirs in Nevada. A biologist with the Lake Mead National Recreation Area (NRA) indicated that between 40 and 60 bald eagles spend the winter at the Lake Mead between November and April and their numbers have been increasing substantially in recent years (Mike Boyle, Lake Mead National Recreation Area, personal communication, July 30, 2001). However, the plan area does not provide any suitable bald eagle wintering or foraging habitat. Bald eagles would likely pass through the plan area during the spring and fall on their way to the NRA and other suitable habitats.

This species was not specifically surveyed for; however, no bald eagles were noted during the SNEI surveys of the entire route in 2002 or during the 2003 SNEI survey of the Las Vegas Wash.

Yuma Clapper Rail

The Yuma clapper rail is listed by the FWS as an endangered species and is protected by the State of Nevada. This long-legged marsh bird lives in fresh and brackish water along rivers in the Colorado River valley and some adjacent areas of California, Arizona and Mexico. The total population is about 1,700-2,000 individuals. They require freshwater marshes containing mature dense stands of cattails and bulrushes, although they may also inhabit tamarisk marsh thickets (Moore, Sealove and Knight, 1993). Nesting occurs on dry hummocks or in small shrubs. Food items include small fish, insects, frogs and crayfish.

The Nevada Natural Heritage Database (NNHP, 2002) has recorded one instance of Yuma clapper rail several miles away from the plan area within the Las Vegas Wash however no nesting has been confirmed. There is marsh habitat appropriate for use by this species near the plan area, in the vicinity of the Las Vegas Wash. However, like the southwestern willow flycatcher, constructed wetlands have not been successful in attracting this species (Titus 2002).

Southern Nevada Water Authority (SNWA) completed FWS protocol surveys for Yuma clapper rail from 2000 to 2003 within the project area of the Las Vegas Wash for an unrelated project. In 2002, project specific protocol surveys were conducted within the project area by FWS-permitted individuals at SNEI. No Yuma clapper rails were detected during any of these surveys.

U.S. Fish and Wildlife Service Candidate Species

Western Yellow-billed Cuckoo

The western yellow-billed cuckoo is the only FWS candidate species with potential to occur in the plan area. This state protected species was designated by the FWS as a Candidate species on July 25, 2001 (66 FR 38611).

SNEI surveys of the entire project area during 2001 and 2002 and surveys of the Las Vegas Wash in 2003 found no occurrence of western yellow-billed cuckoo. Nor was this species detected during FWS protocol surveys conducted from 2000 to 2003 in the Las Vegas Wash area for an unrelated SNWA project (McArthur, July 2003, personal communication).

Relict Leopard Frog

The relict leopard frog is a FWS candidate species and is protected by the state of Nevada. This species was thought to be extinct by the early 1950s, however surveys in 1991 resulted in the discovery of eight populations at historic locations. Of the eight populations found in 1991, two have since gone extinct, including the Arizona population. Reasons for the decline of the relict leopard frog in Nevada probably include water use and the creation of Lake Mead, which eliminated most of the frogs existing habitat. All eight known locations of relict leopard frog are along the north shore of Lake Mead and near Lake Mojave. One population was located along the Virgin River in Arizona. There are no known populations or any known historic locations near the plan area. This species was not surveyed during field investigations.

FWS Species of Concern

"Species of concern" is an informal term that refers to those species that the FWS believes might be in need of concentrated conservation actions. The FWS identified several species of concern that could be located within the plan area. The BLM, NDOW and MSHCP also list species that are sensitive or protected in Nevada.

Reptiles and Amphibians

Table 3-3 lists reptiles and amphibians that are species of concern and state protected.

Table 3-3 Amphibian and Reptile Species of Concern That May Occur Within the Plan Area

Scientific Name	Common Name	Habitat	FWS Status	State/BLM Status	MSHCP Status
Sauromalus obesus	chuckwalla	rocky hillsides and talus slopes, boulder piles, lava bed, or other clusters of rock, usually in association Mojave Desert scrub, which includes black brush, salt scrub and mesquite/catclaw	species of concern	sensitive	covered
Heloderma suspectum cinctum	banded Gila monster	Mojave Desert scrub, mesquite/catclaw, blackbrush, pinyon-juniper and desert riparian	species of concern	protected	evaluation-high
Bufo californicus microscaphus	arroyo southwestern toad	riparian washes, rocky streams, basins, agricultural and urban areas up to 6,000 feet	species of concern	none	evaluation-high

Chuckwalla

The chuckwalla, a FWS species of concern and state sensitive, is a reptile found throughout the deserts of the southwestern United States and northern Mexico. Chuckwallas inhabit rocky outcrops where cover is available between boulders or in rock crevices typically on slopes and open flats below 6,000 feet.

The chuckwalla is a widespread species in the southwest desert but is regionally limited because of its need for rock outcrops. It is widely distributed in Clark County, although it suffered population losses from filling of Lake Mead and development of the Las Vegas Valley (FWS, 2000). Chuckwallas are found in the rocky terrain of the hills and mountain ranges that surround the Valley (BLM, 1998). Habitat for this species also likely occurs in the McCullough pass area and anywhere the project goes through areas with rocky outcrops.

Banded Gila Monster

The banded Gila monster, a state protected reptile species and a FWS species of concern, is one of two species of venomous lizards found in North America. In the Sonoran Desert Gila monsters are typically found in wetter, rockier desert scrub. Little is known about habitat use within the Mojave Desert, but when detected, Gila monsters are often found near washes or intermitten streams where they have access to water or damp soil (Stebbins, 1985).

The range of the Gila monster includes the Mojave, Sonoran and Chihuahuan deserts of extreme southwestern Utah, southern Nevada, southeastern California, western Arizona and southwestern New Mexico into Mexico. Habitat destruction and illegal collection are the main threats to this species (FWS, 2000). Large portions of the plan area, outside the urban areas, are considered Gila monster habitat.

Arroyo Southwestern Toad

The arroyo southwestern toad, a subspecies of the arroyo toad, is the only amphibian FWS species of concern in the project area. This species inhabits streams and arroyos bordered by willow and cottonwoods, washes and adjacent uplands. It also can be found along irrigation ditches, reservoirs and in flooded fields up to 6,000 feet. The range of this species is highly fragmented. There are no arroyo southwestern toads in the plan area (Hobbs, personal communication, 2001).

Riparian Birds

Table 3-4 lists all bird species of concern or sensitive species for the FWS, NDOW and/or MSHCP. Almost all of the region's bird species depend on wetland and riparian habitats during at least some phase of their annual cycle (Dobkin 1998). For those species identified in Table 3-4 as requiring riparian habitat, their presence in the plan area would be limited to the Las Vegas Wash area. However, as discussed above in Section 3.3.1, Botanical Resources, the Las Vegas Wash provides fairly low quality riparian habitat. The location of the riparian vegetation within the Las Vegas Wash can be seen on Map 2: Biological Resources in Appendix A. None of these riparian species are known to nest in the Las Vegas Wash area; however, they could pass through this area during migration.

Table 3-4 Bird Species of Concern That May Occur Within the Plan Area

Scientific Name	Common Name	Habitat	FWS Status	State/ BLM Status	MSHCP Status
Chlidonias niger	black tern	riparian	species of concern	sensitive	none
Empidonax wrightii	gray flycatcher	riparian	species of concern	protected	none
Guiraca caerulea	blue grosbeak	riparian	species of concern	protected	covered
Ixobrychus exilis hesperis	western least bittern	riparian	species of concern	protected	watch list
Phainopepla niten	phainopepla	riparian, mesquite, catclaw-acacia	species of concern	sensitive	covered
Piranga rubra	summer tanager	riparian	species of concern	protected	covered
Plegadis chihi	white-faced ibis	riparian	species of concern	sensitive	watch list
Pyrocephalus rubinus	vermilion flycatcher	riparian	species of concern	protected	covered
Vermivora luciae	Lucy's warbler	riparian, desert wash, mesquite	species of concern	protected	none
Vireo bellii arizonae	Arizona Bell's vireo	riparian	species of concern	protected	covered
Athene cunicularia hypugea	western burrowing owl	agriculture, desert scrub, sagebrush, grassland	species of concern	proposed sensitive	evaluation-high
Falco peregrinus anatum	American peregrine falcon	wetlands, agriculture, sagebrush, grassland, urban	species of concern	sensitive	covered
Buteo regalis	ferruginous hawk	agriculture, desert scrub, sagebrush, grassland	none	proposed sensitive	watch list

Most of the birds nesting in the plan area are protected under the Migratory Bird Treaty Act (MBTA). The MBTA of 1918 and subsequent amendments (16 U.S.C. 703-711) state that it is unlawful to take, kill or possess migratory birds. Few bird species found in the United States are not protected by the MBTA. Migratory birds potentially nesting in the plan area also include cactus wren, sage sparrow, black-throated sparrow, killdeer and western meadowlark.

Raptors

Western Burrowing Owl

Western burrowing owls are year-round residents, breeding throughout southern Nevada in the summer and wintering just south of the plan area (Rappole, 2000). This species lives in open lands in association with burrowing animals such as prairie dogs, kit fox and desert tortoise. Nesting occurs in burrows, where the young stay until ready to fledge. Preferred habitats in Clark County include grassland, Mojave desert scrub and sagebrush/perennial grassland. Their diet includes large insects, reptiles, amphibians and small rodents (FWS, 2000). Threats to this species include loss of habitat, poisoning of prey species and highway mortality (FWS, 2000). Most of the plan area, outside of the urban areas, is potential burrowing owl habitat.

Peregrine Falcon

The peregrine falcon was removed from the endangered species list in August 1999. This species lives in open areas near water and are year-round residents of the Colorado River Valley (Rappole, 2000). Peregrine falcons nest on cliffs, preying mainly on birds (National Geographic, 1987). They are known to breed on buildings in the Las Vegas Valley and at Lake Mead (FWS, 2000). A pair of peregrine falcons has been nesting at the River Mountains and there is a new territory at Sunrise Mountain (Tomlinson, personal communication, 2001). Peregrine falcons are probably using parts of the plan area for foraging year round.

Ferruginous Hawk

The ferruginous hawk inhabits dry, open country and perches in trees, poles and on the ground (National Geographic, 1987). This species has no Federal status but is state protected and on the MSHCP watch list. The entire plan area is potential wintering habitat for the ferruginous hawk, but it occurs infrequently (FWS, 1992; Tomlinson, personal communication, 2001).

Mammals

Table 3-5 lists all mammal species of concern with potential to occur in the plan area. Mule deer and desert bighorn sheep are the only large mammals potentially occurring in the plan area. Both are state protected species but are hunted in Nevada as big game.

Mule Deer

Mule Deer typically move between various zones from higher elevations to the desert floor, depending on the season and food supplies. Generally, they summer at higher elevations and winter at lower elevations. Mule deer occupy a range of habitat, yet they seem to prefer arid, open areas and rocky hillsides (NDOW, 2003). Areas with bitterbrush and sagebrush provide common habitat. Mature bucks tend to prefer rocky ridges for bedding grounds, while does and fawns are more likely to bed down in the open. Breeding season or rut typically occurs from November to December with a seven-month gestation period.

Mule deer may be found occasionally within the plan area but habitat is limited. The McCullough Mountains in the southern portion of the plan area provide some habitat needs, but do not support a large population due to limited water availability (Shepard, NDOW, personal communication, September 2003).

Desert Bighorn Sheep

Desert bighorn sheep prefer rough, rocky and steep terrain, broken up by canyons and washes. Because bighorn sheep habitat in Nevada has hot summers and little annual precipitation, water during summer months can be a limiting factor and in drought conditions can drastically impact lambing and survival (NDOW, 2003). Although rams may go three days without water, ewes and lambs come to water holes almost daily during the hot, dry summer months. The breeding season or rut generally extends from July through September with a six-month gestation period.

Table 3-5 Sensitive Mammal Species That May Occur Within the Plan Area

Scientific Name	Common Name	Habitat	FWS Status	State/BLM Status	MSHCP Status
Ovis canadensies	desert bighorn sheep	rocky hillsides and mountains	none	protected	watch list
Odocoileus hemionus	mule deer	mixed habitats, forest edges, mountains and foothills	none	protected	none
Corynorhinus townsendii pallescens	pale Townsend's big-eared bat	low desert to high mountain, highly associated with caves and mines	species of concern	protected	evaluation-high
Euderma maculatum	spotted bat	wide range of habitats, linked to availability of cliff roosting	species of concern	threatened	watch list
Eumops perotis californicus	greater western mastiff bat	wide range of habitats, roosts in cliffs and boulder cracks	species of concern	protected	watch list
Idionycteris phyllotis	Allen's big-eared bat	pine-oak forested canyons and coniferous forests, may occur in non-forested, arid habitats, near cliffs, outcroppings, boulder piles or lava flows	species of concern	protected	watch list
Macrotus californicus	California leaf-nosed bat	low elevation desert scrub, common in caves in lower desert areas	species of concern	protected	watch list
Myotis ciliolabrum	small-footed myotis	desert scrub, grasslands, sagebrush steppe and pinyon-juniper woodlands and pine forests	species of concern	protected	evaluation-medium
Myotis evotis	long-eared myotis	higher elevation, ponderosa pine	species of concern	protected	covered
Myotis thysanodes	fringed myotis	wide range of habitats from upper elevation creosote bush desert to 7,000 feet in the white pine mountains	species of concern	protected	evaluation-medium
Myotis velifer	cave myotis	lower elevations in arid habitat dominated by creosote bush, palo-verde, brittlebush, cactus and desert riparian	species of concern	protected	watch list
Myotis volans	long-legged myotis	mid-high elevations, pinyon-juniper, joshua tree woodland and montane coniferous forests	species of concern	protected	covered
Myotis yumanensis	Yuma myotis	low to middle elevations in a wide variety of habitats including urban areas	species of concern	protected	watch list
Nyctinomops macrotis	big free-tailed bat	mainly canyonlands, found in arroyo, scrub desert, woodlands and riparian areas	species of concern	protected	watch list

The proposed route would cross bighorn sheep habitat in the southern portion of the plan area. Potential bighorn sheep habitat is shown on Map 2: Biological Resources in Appendix A. The NDOW does annual aerial surveys for bighorn sheep. According to NDOW survey data, bighorn sheep are now mainly in the southern portion of the plan area (mileposts 36 to 42) due to development and lack of water in more northern areas (Shepard, NDOW, personal communication, September 2003). The latest population estimate for this area is approximately 200 adults.

The NDOW has also overseen the installation of "water guzzlers", systems built into the environment to direct rainwater into collection tanks to make up for water sources lost to development in the Las Vegas area. Several of these guzzlers are located just outside the plan area in the McCullough Mountains. Minimizing development that may impede the movement of sheep from their feeding and lambing areas to these water sources is a key concern for NDOW.

Bats

Twelve species of protected bats occur in the plan area: Pale Townsend's big-eared bat; spotted bat; greater western mastiff bat; Allen's big-eared bat; California leaf-nosed bat; small-footed myotis; long-eared myotis; fringed myotis; cave myotis; long-legged myotis; Yuma myotis; and big free-tailed bat.

Since there are very few trees, caves or mines in the plan area, bats' use of the area is limited to occasional foraging. According to the Nevada Bat Conservation Plan, most foraging takes place adjacent to water (Altenbach et al., 2002). Water is scarce in the plan area, therefore, it is expected that bat use of the plan area would be limited to areas surrounding the Las Vegas Wash.

3.3.4 Air Quality

Introduction

The plan area would be located within Clark County and traverses three air basins: Apex Valley, Black Mountains Area and Las Vegas Valley basins. Ambient air quality is primarily a result of the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin and the meteorological conditions. Ambient air quality standards (AAQS) have been developed by the Federal and state governments in order to establish levels of air quality which, when exceeded, may cause adverse effects to human health.

Regulatory Framework

The Nevada Division of Environmental Protection (NDEP) Bureau of Air Quality (BAQ) is charged with maintaining and improving the air quality for citizens of the State of Nevada. The Clark County Department of Comprehensive Planning and the Clark County Department of Air Quality Management (DAQM) review air quality issues within Clark County.

In 1990, the Federal government passed the Clean Air Act Amendments (CAAA). When the CAAA were created, the Las Vegas Valley was classified as a moderate non-

attainment area. Those regions that have a non-attainment status must implement a series of programs to achieve attainment and reduce PM_{10} pollution, airborne particulate matter with a diameter of less than or equal to 10 microns.

Due to its classification as a moderate non-attainment area for PM_{10}, Clark County developed a Moderate Area State Implementation Plan (SIP) in 1991. In early 1993, the United States Environmental Protection Agency (EPA) reclassified the Las Vegas Valley to a "serious" non-attainment area for that pollutant. In 1994, the County Board submitted a new PM_{10} air quality plan to the EPA, which provided for the implementation of best available control measures. More recently, in August 1997, the Board adopted the "Particulate Matter (PM_{10}) Attainment Demonstration Plan" for the Las Vegas Valley and submitted it to the EPA for review and approval.

Clark County is in attainment status for both the Clark County AAQS and the Federal NAAQS for all pollutants, except for Carbon Monoxide (CO) and Particulate Matter (PM_{10}) as described below. The State of Nevada has a separate set of Air Quality Regulations and its own state ambient air quality standards. These standards are quite similar to the Federal NAAQS. Air quality regulations administered by Clark County DAQM apply to actions within the county. These ambient air quality standards are more stringent than the Nevada and Federal standards and are obtained from the District Board of Health of Clark County Air Quality Regulations, Section 11, Ambient Air Quality Standards, revised 5/27/93.

The DAQM is primarily responsible for regulating all stationary and non-vehicular sources including construction sources of fugitive dust. According to Section 17 of their regulations, a plan-specific permit is required for construction activities involving surface disturbances greater than one-quarter acre, such as grading and trenching. This permit would include conditions requiring control of fugitive dust emissions, as defined in Section 41 of the regulations. Fugitive dust control measures have been incorporated into the Proposed Action.

Inventory Methods

Air quality monitoring data was obtained from the EPA and DAQM and was evaluated to characterize the existing air quality in the region. Meteorological data was obtained from the Western Regional Climate Center (WRCC), which is one of six regional climate centers in the United States.

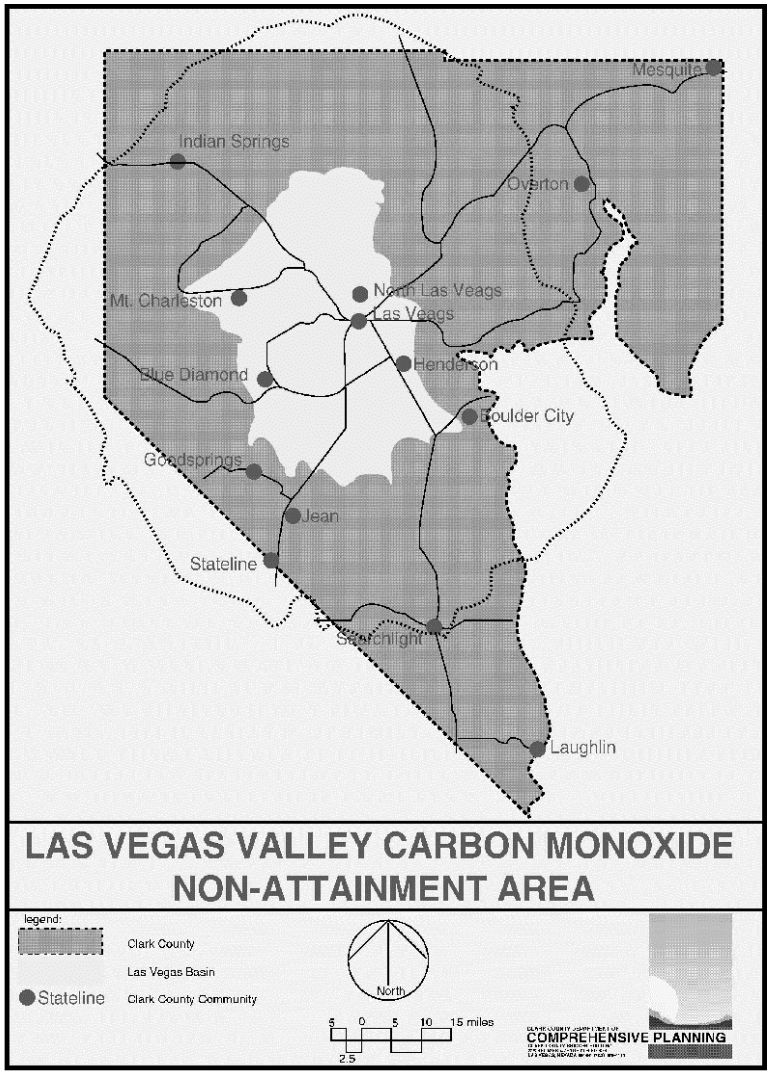
Inventory Results

Air Quality

The closest air monitoring stations to the plan area are located in Apex Valley and Boulder City, Nevada. The major air pollutants that are in non-attainment for Clark County are CO and PM_{10}, described below. Non-attainment areas are air quality control regions for which the EPA has determined that ambient air concentrations exceed national ambient air quality standards.

Carbon Monoxide

CO is produced primarily by incomplete fuel combustion in motor vehicles. CO has a toxic potential to human health. The major effects of CO occur near its sources (busy streets and freeways). There are two National Ambient Air Quality Standards (NAAQS) for carbon monoxide. The one-hour standard has a maximum allowable concentration of 35 parts per million (ppm). The eight-hour standard is a maximum average of 9 ppm over an eight-hour period. Areas that violate one or both of the ambient standards more than two times in a two-year period are classified as non-attainment areas for carbon monoxide. Refer to Figure 3-1 for a map of the CO non-attainment area.



Source CO State Implementation Plan, 2000

Figure 3-1 Las Vegas Valley Carbon Monoxide Non-Attainment Area

Previously, portions of the Las Vegas Valley violated the NAAQS for CO during the winter months. The number and severity of the CO violations caused the EPA to designate the Valley as a “moderate non-attainment area” on November 15, 1990. The Las Vegas Valley was later reclassified as a "serious" non-attainment area for CO.

The one-hour standard for CO has never been exceeded in the Las Vegas Valley. The eight-hour standard has not been exceeded since 1998 (F. Durosinmi, DAQM, personal communication, December 2003). As a result, the DAQM is in the process of applying for the Clark County airshed to be an attainment area. Refer to Figure 3-1 for a map of the CO non-attainment area. The dotted line around the non-attainment area (Basin 212) represents a 25-mile zone to consider sources that may contribute CO emissions.

Particulate Matter

Particulate matter is the term used for a mixture of solid particles and liquid droplets found in the air. Particulate matter pollution consists of very small liquid and solid particles floating in the air including dust, metals, smoke, soot and acids. Coarse particles (larger than 2.5 micrometers) often come from a variety of sources, including windblown dust, according to the SIP plan for particulates drafted in June of 2001. These coarse particles are less than 10 microns in diameter, or about one seventh the thickness of a human hair and are known as PM_{10}. Of greatest concern to public health are the particles small enough to be inhaled into the deepest parts of the lung. These fine particles (less than 2.5 micrometers) often come from fuel combustion, power plants and diesel buses and trucks.

The major sources of PM_{10} exceedances identified by monitoring stations in Clark County were very closely related to wind gusts (F. Durosinmi, DAQM, personal communication, June 2003). In the Valley, fugitive dust from paved and unpaved roads, construction activities and disturbed vacant land are also known sources. It should be noted that wind gusts were in the 30 to 50+ mph range during the exceedances observed by the monitoring stations.

Information regarding exceedances was obtained from the Clark County web site for the years 1991 through 2001. A personal fax from Mr. Durosinmi, the air-monitoring supervisor, provided the additional 2002 information.

Since 1991, PM_{10} was exceeded for the following number of days per year through 2002 (Table 3-6):

Table 3-6 PM_{10} Exceedence Days by Year for Clark County

1991 - 4	1995 - 16	1999 - 9
1992 - 10	1996 - 16	2000 - 4
1993 - 2	1997 - 13	2001 - 3
1994 - 9	1998 - 6	2002 - 11

According to Clark County, the high number of exceedance days (11) in 2002 for PM_{10} was caused by an unusual number of high wind events in the Valley (F. Durosinmi, DAQM, personal communication, December 2003).

3.3.5 Visual Resources

Introduction

The presence of a new high-voltage transmission line within the plan area is of concern to both land managing agencies and the public regarding its visual impact. The following issues were identified in the plan area:

- Residents from the City of Henderson expressed concern for neighborhood aesthetics.
- The BLM expressed concern for visual impacts in the Sunrise Management Area (SMA) Plan as a result of additional utility rights-of-way through the SMA.
- Clark County and environmental groups expressed concern for scenic intrusion upon viewsheds found in the Rainbow Gardens geologic area including proposed trailheads and scenic drives near milepost 27 of the plan area.

Inventory Methods

The visual inventory was conducted using principles derived from the BLM Visual Resource Management (VRM) system 8400 series manuals (BLM, 1984) and modified to accommodate urban landscapes. There are no formal guidelines for managing visual resources on private, state-owned lands or the other Federally-managed lands within the plan area. The VRM methodology provided a consistent inventory process across the study area for all public and private lands.

A six-mile wide plan area was inventoried to document existing visual resources for the 48-mile long proposed route. The study process included analysis of topographic maps and aerial photography (from March 2001), agency contacts, field reconnaissance and review of existing literature sources. The result is a consistently inventoried database used to assess impacts (Chapter 4) for each of the alternative corridors.

Visual resource maps can be found in Appendix A. Definitions of visual resource terminology and descriptions of the specific inventory methods used for gathering and completing the visual resource inventory are included in Appendix B.

Inventory Results

Much of the landscape has had some level of disturbance including freeways, highways, gas pipelines, other electric transmission lines, military operations, railroads and residential subdivisions.

Scenic Quality Class

Scenic quality classes were derived from a resource inventory. Table 3-7, Scenic Quality/Visual Integrity Comparison, depicts typical landscapes representing the range of scenic quality classes resulting from this inventory. Class A landscapes accounted for approximately 5 percent (11,201 acres), Class B accounted for approximately 5.4 percent (12,207 acres) and Class C landscapes accounted for 89.6 percent (202,916 acres) of the total area inventoried. The following paragraphs describe each of the scenic quality

Table 3-7 Scenic Quality/Visual Integrity Comparison

SCENIC QUALITY		VISUAL INTEGRITY	
REPRESENTATIVE PHOTO	**DEFINITION**	**REPRESENTATIVE PHOTO**	**DEFINITION**
	***Class A or Distinctive*** - Outstanding areas where characteristic features of landform, rock, water and vegetation are distinctive or unique in the context of the surrounding areas. These features exhibit considerable variety in form, line, color and texture and have strong positive attributes of unity and intactness. A score of 25 points or more, as tallied on an individual field inventory sheet, results in a distinctive rating.		***Class A or Unique / Cohesive -*** Developed areas where the landscape appears intact, interesting and cohesive. The characteristic elements of line, form, color and texture hold the developed features and landscape together into distinctive areas, landscapes, or neighborhoods. Colors and textures are often seen repeated in these landscapes. Developments and land uses do not contrast with each other or with the landscape.
	***Class B or Above Average*** - Above average areas where features provide variety in form, line, color and texture. Landscape elements may not be rare, but provide sufficient visual diversity to be considered moderately distinctive. Features exhibit common variety in form, line, color, texture and have positive, yet more common attributes, of unity and intactness. The score of 18 to 24 points resulted in an above Average rating.		***Class B or Average / Rural Landscape -*** Developed areas where the landscape is less unique, interesting and cohesive. Patterns of land use and materials used in structures are varied and different colors. The sense of a cohesive place or neighborhood is not as strong in these landscapes. Colors and textures are not often seen repeated in these areas.
	***Class C or Common -*** Common to minimal areas have characteristic features with moderate to little variety in form, line, color and texture in relation to the surrounding region. The score of 17 points or less, as tallied from an individual field inventory sheet, resulted in a Common rating.		***Class C or Representative -*** Developed areas that appear heavily altered, do not form a sense of place or neighborhood and are not visually cohesive. The elements of line, form, color and texture are not often repeated in a cohesive manner. Developments and land uses are diverse and contrast with each other and with the landscape.

classes identified in the plan area. Refer to Map 4: Visual Resources - High Sensitivity Views and Map 5: Visual Resources - Moderate Sensitivity in Appendix A.

Class A

Lake Las Vegas, located within the Henderson City limits, was considered Class A due to its predominance of vegetation, water, landform and diversity in color. Rainbow Gardens and Lava Butte located on public land north of Lake Las Vegas were also considered Class A due to their predominance of bold landforms and diversity in color and textures. All Class A landscapes occur on the central to southern portions from milepost 22 to 27.

Class B

Several Class B landscapes were identified in the plan area and typically consist of human-made features such as parks, golf courses and planned unit developments. These areas contribute to the urban landscape setting with introduced vegetation, color and water (residences near Equestrian Substation). Natural Class B landscapes are mostly associated with the lower foothills and the mountains of the River Mountains and McCullough Range near the southern portion of the plan area. Another Class B landscape consists of a large alluvial fan or bajada that drifts from Rainbow Gardens in a southwesterly direction towards the Las Vegas Wash. Near the central portion of the proposed route, a Class B landscape of foothills and mountains rise towards both Sunrise and Frenchman's Mountain and display unique geologic formations and landforms.

Class C

The majority of the Class C rating includes nearly flat landscapes with minimal scenic diversity. Vegetation is sparse and consists of mixed desert scrub with creosote bush, yucca and cactus species interspersed along the plan area. Other Class C areas are found along southern portions of the plan area within urban environments where built features dominate the landscape and visual integrity is low.

Viewer Sensitivity Inventory

Viewer sensitivity levels were determined by consulting agencies, city officials, state and local transportation departments and through field investigations. Sensitive viewpoints identified in the study area were inventoried into five categories – residences, planned land use, parks and recreation areas and travel routes.

High, moderate, or low viewer sensitivity levels were assigned to each inventoried viewpoint. Generally, all residences, recreation areas or recreation destination roads were identified as a high. Moderate viewer sensitivity typically included planned land uses and general use roadways. Low visual sensitivity viewpoints were identified but not carried forward for analysis. Visibility/Distance Thresholds are illustrated on Maps 4 and 5 in Appendix A for high and moderate sensitivity viewpoints. The following paragraphs discuss each of the inventoried viewpoint categories.

Residences

All residences were considered high sensitivity due to high concern (user attitude) and long view duration. Residences are associated with the cities of Henderson and Boulder

City. Proximate and high visibility views occur on the central and southern portions of the plan area from residences within the city of Henderson.

Planned Land Use

Planned Land Uses were considered moderate sensitivity because the Proposed Action would precede construction of the planned uses. This includes those planned residential developments that, at the time of this analysis, have received preliminary plat approval and a planned college campus immediately southeast of Henderson, Nevada State College at Henderson. Proximate and high visibility views from these planned land uses would occur along the central and southern portions of the plan area.

Parks and Recreation Areas

Existing parks and recreation areas are located within either the Henderson City Limits or the River Mountains. Individual use and large gatherings occur at these locations, resulting in high viewer sensitivity (high use volume, high user attitude and moderate viewing durations). Proximate and high visibility views from these areas include the Clark County Wetlands Park near milepost 27 and the River Mountains Loop Trail. Planned parks and recreation areas include the city of Henderson Equestrian Park and four smaller parks contained within the Lake Las Vegas Resort. Planned parks and recreation were considered moderately sensitive because the Proposed Action would precede the construction of these planned areas.

Travel Routes

State Routes 146/5, 147, 166, 167 and U.S. Highway 93 near Boulder City are recreation destination roads. These routes have high viewer sensitivity due to the moderate to high user attitude, short duration of view and moderate user volume. Proximate and high visibility views from these routes would include the Proposed Action. Moderate sensitivity travel routes include State Routes 582 and 604, U.S. Highway 95, U.S. Highway 93 near Harry Allen Substation and Interstates 15 and 515. Proximate and high visibility views from the moderate viewer sensitivity travel routes would include the Proposed Action.

BLM Visual Resource Management Classes and Objectives

VRM (Visual Resource Management) Classes were inventoried and mapped within the plan area. GIS data provided by the BLM were utilized to determine the location and classification of management classes on BLM-administered lands. Map 2-9 found in the BLM Las Vegas RMP (BLM, 1998) was also used as a reference. VRM classes for BLM-administered lands within the plan area were established in this RMP.

Approximately 75 percent of the plan area is within BLM-administered Lands. Approximately 10 percent of these lands are VRM Class II designation; however, the Proposed Action does not cross any of these Class II areas. Seventy-five percent are Class III and approximately 15 percent are Class IV.

VRM Class II objectives are to retain the existing character of the landscape. Within Class II areas, actions may not modify existing landscapes or attract the attention of casual viewers. Management objectives for lands within VRM Class III allow for authorized actions that may alter the existing landscape, but not to the extent that they

attract or focus attention of the casual viewer. Class IV objectives allow for authorized actions that may create significant landscape alternations that would be obvious to the casual viewer.

The VRM objectives and management direction identified in the BLM RMP is to limit future impacts on the visual and aesthetic character of public lands. A summary of VRM impacts for the BLM-administered lands is found within the RMP on page S2-13 under Rights of Way Management, Alternative A: "Designation of corridors would help protect viewsheds by concentrating impacts within specific geographic areas and corridors would have moderate visual impacts."

3.3.6 Cultural and Ethnographic Resources

Introduction

BLM and the cooperating agencies negotiated a specific Programmatic Agreement to satisfy compliance with Section 106 of the National Historic Preservation Act of 1966 (NHPA) for the proposed transmission line project. The BLM Las Vegas Field Office serves as the lead Federal agency with respect to NHPA Section 106 compliance.

Far Western Anthropological Research Group Inc. (Far Western) was contracted by Nevada Power to conduct a cultural resources inventory of the project corridor in accordance with Nevada BLM Class III Inventory protocol (Barker 1990) and the 2001 State Protocol Agreement between BLM and the Nevada State Historic Preservation Office (SHPO). Ms. Ginny Bengston was contracted by Nevada Power to assist with Native American consultation requirements. She also undertook an ethnographic assessment aimed at identifying areas that tribes consider culturally significant and determining if construction of the transmission line might affect those areas.

For inventory purposes, the Area of Potential Effects (APE) included the right-of-way and minimally 100 feet on each side of it, extending beyond this 100 feet on one side to include existing roads. In addition, inventory was completed of a 100-foot wide swath overlying numerous other existing dirt roads considered corridor-access options. In one instance, the APE was drawn to include a resource near but outside of the study corridor: Gypsum Cave is included in the APE because of its high visibility and the level of concern that some in the archaeological community and Native American communities have for it.

Cultural Resources Inventory Methods

The cultural resources archaeological inventory included a records search, development of a research design, pedestrian survey of the study corridor to Class III inventory standards and preparation of an inventory and evaluation report (Nevada Cultural Resources Report No. CR5-2462(P)). Enhanced site recordation procedures were implemented that included technological characterization of flaked stone tool and debitage assemblages, quantification of tool classes and material types, in-field analysis of ground stone, as well as probing for intact subsurface cultural deposits. This level of effort was applied in order to obtain adequate information to evaluate the significance of the prehistoric and historic resources encountered.

The project area was intensively surveyed using a series of transects spaced no more than 30 meters apart. Typically a crew of three or four persons conducted a sweep survey of the corridor, while access roads were covered by one individual who surveyed a 10-15 meter wide strip of undisturbed land adjacent to the edge of an existing dirt road, walking down one side of the road and returning on the opposite side, resulting in 100-foot wide coverage. Lathe stakes marked the proposed centerline and the right-of-way limits throughout most of the corridor, facilitating survey spacing, orientation and location. In addition, high-resolution, project-corridor, aerial photo maps were provided and used during the fieldwork, showing the survey limits, existing roads, existing transmission-line towers and numerous landmarks.

In addition to the Class III inventory, an ethnographic study was undertaken, consulting with Native Americans in order to identify culturally significant areas that might be affected by the proposed project. Work completed as part of the ethnographic assessment included archival and literature review and contacts with several Native American tribes through meetings, field visits and interviews.

In satisfying Section 106 of the NHPA requirements concerning consulting with appropriate Native American tribes, the lead agency consulted with 12 Native American tribes and four Paiute bands that claim ancestral ties to, or traditional cultural use of, project area lands. All but one of these tribal entities are Federally recognized. In December 2002, BLM mailed copies of an interested parties letter under NEPA guidance, which included 16 tribal groups. Specific to Section 106 consultations, two subsequent mailings occurred during 2003, each to the tribal leaders of 16 groups. The first of these consultation letters provided a brief description of the project and requested tribal input concerning potential impacts to culturally significant areas within the APE. The letter also offered tribes the opportunity to meet with BLM representatives to discuss the project. Follow-up telephone calls succeeded in contacting all but two of the 16 tribal groups. A second letter summarized the results of the archaeological study and included a list of sites and isolated finds found during the inventory. Follow-up contacts resulted in two separate field visits with representative of three different tribal entities (Las Vegas Paiute Tribe, Moapa Paiute Tribe and Colorado River Indian Tribes) and three others requested and received a copy of the final archaeological inventory report. Details about the information gathered during communication with the tribes is provided in the ethnographic assessment report submitted (Bengston, 2003).

Cultural Resources Inventory Results

The records search indicated that much of the corridor had been previously inventoried, with numerous sites recorded in and adjacent to it. Some of these were found in the 1970's during work completed for the adjacent Navajo-McCullough and Intermountain Power Project transmission lines. Many, however, are in the Las Vegas Wash vicinity, where numerous archaeological studies have taken place, prompted by a substantial amount of high-end urban development and municipal infrastructure improvements for Las Vegas and Henderson.

The archaeological inventory identified a total of 56 sites and 168 isolated finds in the project area, with 32 of the sites previously recorded in some fashion, and 24 being newly found. In total, 31 of the sites are prehistoric only in age, and these include five Complex

Feature/Artifact Assemblage Sites that represent base-camp/habitation sites; 10 Complex Feature/Artifact Assemblage Fragile Pattern Sites; one Simple Milling/Pottery Assemblage; one Simple Flaked Stone Assemblage; five Quarries; eight Segregated Reduction Locations (SRLs); and one Petroglyph boulder. Five other sites are less definitively prehistoric in age; three rockshelters (two with rock walls, the other with charcoal fragments), a series of cairns and an enigmatic shallow, basin-shaped depression.

Of the remaining sites, 19 are historic-period only resources; ten thematically relate to transportation, three link to mining activities, two are associated with the construction of Hoover Dam, and four are unfocused trash scatters.

One site contains both prehistoric and historic components; the prehistoric component is a Complex Feature site with no associated assemblage, only a cluster of small, basin-shaped depressions; the historic component relates to mining activities.

Twenty-four of the sites have characteristics and sufficient integrity that qualify them as eligible for listing on the National Register of Historic Places (NRHP). These are listed in the cultural impacts table in Appendix D. None of the isolated finds qualify. Nineteen of the significant sites are prehistoric; five are historic period in age.

Consulted tribes identified only two culturally significant areas within the project area, both corresponding with eligible sites: Gypsum Cave (26CK5) and a petroglyph boulder (26CK6797). Contacted tribes did not specifically identify any of the other previously or newly recorded archaeological sites as culturally significant.

The Nevada SHPO concurred that 24 project sites are eligible for nomination to the NRHP, and all or relevant segments of the 32 other project sites are not eligible under any NRHP criteria.

3.4 Additional Resources Inventoried

3.4.1 Land Use

Introduction

The plan area has a mixture of privately owned lands and lands administered by various Federal, state and local agencies. Public land administered by the BLM is located throughout the plan area along with land managed by the USBR, Western, University of Nevada, Las Vegas (UNLV) and Clark County. Incorporated areas within the plan area include the cities of Henderson and Boulder City. The entire plan area lies within Clark County.

Inventory Methods

The inventory was compiled through an investigation and interpretation of existing maps and March 2001 aerial photographs within and adjacent to the plan area. The inventory data were collected within a 1.5-mile-wide plan area, 0.75 miles on either side of the assumed centerline of the proposed route. The existing mapped information was verified

by ground reconnaissance of selected portions of the plan area in September 2001 and January 2002. Key Federal, state and local land resource agencies were contacted to renew official information and to solicit further relevant information. A comprehensive listing of data sources is provided in the References section in Chapter 7.

The land use database was compiled in maps and used to graphically portray information relating to each component (see Appendix A, Map 3: Land Use).

Inventory Results

Land Jurisdiction

Land jurisdiction refers to the administrative authority of Federal, state or local governmental agencies. Jurisdiction does not necessarily imply land ownership. For example, privately owned lands may be subject to a local authority like a county or municipality. The following land jurisdictions were identified and delineated using BLM and Clark County Geographic Information System (GIS) data layers as well as agency maps.

Bureau of Land Management (USDI, BLM)

BLM is based on the principles of multiple use and sustained yield of the nation's resources including recreation, rangelands, timber, minerals, watershed, wildlife, fish and wilderness, air and scenic, scientific and cultural. A large portion of the plan area contains public lands managed by the BLM.

Bureau of Reclamation (USDI, USBR)

USBR has primary responsibilities as manager of Federal water resources and associated programs or facilities. The USBR lands are found in the southern half of the plan area.

Western Area Power Administration (Western)

Western markets and delivers cost-based hydroelectric power and related services within a 15-state region of the central and western U.S. The Western lands are situated in the southern portion of the plan area.

Additional Jurisdictions

Additional jurisdictions within the plan area include the National Park Service (NPS) lands associated with the Lake Mead National Recreation Area located on the eastern edge of the 1.5-mile wide land use study corridor. The State of Nevada, the University of Nevada Las Vegas and cities and counties are also included within the land use study corridor, as are portions of the cities of Henderson and Boulder City. The entire plan area is situated within Clark County.

Existing Land Use

Existing land use identifies the various surface structures, improvements and land use designations occurring within the plan area as of April 2003. Categories, listed below, were identified to differentiate between types of existing land use. Appendix A, Land Use Map identifies existing land use in the plan area.

- Residential

- Commercial
- Public
- Industrial
- Communication Facilities
- Air Facilities
- Linear Features
- Mining

Planned Land Use

Designated Utility Corridors

Section 503 of the Federal Land Policy and Management Act of 1976 (FLPMA) states that the Secretary of the Interior shall designate corridors to minimize adverse environmental impacts and the proliferation of separate right-of-ways (BLM, 2003). The BLM has a longstanding partnership with the Western Utility Group (WUG) concerning the planning, identification and designation of utility corridors in the western United States.

The Proposed Action would be located within a designated utility corridor for all but eight miles of the proposed route. Refer to Map 1: Proposed Alignment in Appendix A for the location of designated utility corridors within the plan area. The proposed route is located within portions of the following BLM designated utility corridors:

- Dry Lake Valley (3,000 feet wide)
- Black Mountain-Crystal (500/1,400/2,000 feet wide)
- Boulder-Primm North (2,000 feet wide)
- Boulder-Primm South (3,000 feet wide)

BLM Las Vegas Resource Management Plan

In June 1998, the BLM issued a final Las Vegas Resource Management Plan (RMP) and signed a ROD approving the plan in October 1998. The RMP provides a comprehensive framework for managing approximately 3.3 million acres of public lands administered by the Las Vegas Field Office. This plan guides the management of the public land resources for the next 20 years for portions of Clark County and southern Nye County in southern Nevada.

Standard Operating Procedures pertaining to lands within the RMP indicate that Federal land is available for rights-of-way purposes, except within designated rights-of-way exclusion areas.

The Sunrise Management Area Interim Management Plan

This Plan was approved in May 2000, as an interim plan for an identified project area within the Sunrise Mountain Special Recreation Management Area (SRMA) and Rainbow Gardens ACEC. The area is referred to as the Sunrise Management Area (SMA). The SMA is located in Clark County, approximately five miles east of Las Vegas. The SMA boundary is the same as the Sunrise Mountain SRMA and Rainbow

Gardens ACEC and includes 37,620 acres. The Plan focuses on 21,578 acres within the SMA.

Lake Mead National Recreation Area General Management Plan

The Lake Mead National Recreation Area (LMNRA) General Management Plan and Environmental Impact Statement were finalized in 1986. According to the LMNRA General Management Plan, (Easements, Utility Corridors and Memorandums of Understanding): "Various easements and utility corridors have been granted in the past. The National Park Service would generally oppose granting any further corridors; instead, additional use of existing corridors would be favored in the event there is a justified need for additional utility lines through the NRA."

Clark County Comprehensive Plan

The Clark County Comprehensive Plan describes land uses throughout the county, provides for regional services and facilities and governs development within unincorporated areas. Plan components consist of land use maps and policies that define a development pattern suitable for the four unincorporated towns and surrounding undeveloped areas. Goals and policies relevant to transmission line siting within the land use plan and development guides encourage the joint use of corridors by utilities and use of existing corridors whenever possible.

Clark County Multiple Species Habitat Conservation Plan

The Clark County Multiple Species Habitat Conservation Plan is intended under Section 10(a) of the Federal Endangered Species Act to support the issuance, by the FWS, of a permit or permits (Section 10(a) Permit) which would:

- Allow the "take" of threatened or endangered species resulting from otherwise lawful activities on non-Federal properties within the county; and
- Allow the "take" of threatened or endangered species that are currently unlisted but may become listed in the future.

Additional Land Use Plans Inventoried

In addition to the areas described above, the following planned land uses were inventoried.

- Clark County School District
- City of Henderson Comprehensive Plan
- Boulder City Master Plan
- Southern Nevada Regional Policy Plan

Parks, Recreation and Preservation Areas

Wilderness

There are no designated Wilderness Areas within or adjacent to the plan area.

BLM Sunrise Mountain Instant Study Area

The Sunrise Mountain Instant Study Area is located at the eastern edge of Las Vegas and was designated in 1970 as Sunrise Mountain Natural Area. The area was identified as

having unique geologic, biologic and aesthetic values. A total of 29,475 acres were studied, and it was determined the area lacked wilderness characteristics. As a result, the BLM recommended that the study area be dropped from the wilderness review process. A portion of the BLM designated utility corridor passes through the Sunrise Mountain Instant Study Area. Activation and use of this portion of the utility corridor was contingent upon congressional action.

Nine thousand and nine hundred and fifty two (9,952) acres of the original 10,240 acres of the Natural Area continues to be managed as an Instant Study Area until such time that Congress either designates it as wilderness or releases it from further study. The other 288 acres, which run through the center of the ISA, have been released from further study through the Clark County Conservation Of Public Land And Natural Resources Act Of 2002, Public Law 107-282. A portion of these released acres have been designated as a 500-foot-wide utility corridor.

BLM Area of Critical Environmental Concern (ACEC)

Two BLM ACECs, Rainbow Gardens and River Mountains, are located in the plan area. Rainbow Gardens ACEC consists of 37,620 acres and contains geological, scientific, scenic, cultural (320 acres) and sensitive plant values. The River Mountains ACEC consists of 5,617 acres and contains bighorn sheep habitat and is a scenic viewshed for Henderson and Boulder City. Both of these ACECs have been designated right-of-way avoidance areas except within BLM-designated utility corridors. Both ACECs would be crossed by the assumed centerline of the Proposed Action within the Black Mountain – Crystal BLM designated utility corridor.

Additional Parks, Recreation and Preservation Areas Inventoried

In addition to the areas described above, the following parks, recreation or preservation areas can be found on Map 1: Proposed Alignment in Appendix A.

- Lake Mead National Recreation Area (LMNRA)
- Old Spanish National Historic Trail
- University of Nevada, Las Vegas
- Clark County Wetlands Park
- City of Henderson Parks and Recreation Department
- Lake Las Vegas Resort

3.4.2 Socioeconomics

Introduction

The socioeconomic analysis characterizes the human resources occupying the areas near the Proposed Action. Residences, places of work, institutions and their associated social and economic activities and facilities are subject to changes arising from construction and operation of the transmission line. This section provides a brief inventory of the status and trends of those resources as basis for assessing the socioeconomic impacts of the Proposed Action in Chapter 4.

Inventory Methods

Population characteristics are the principal measure of an area's socioeconomic situation. The primary source of data on population is the decennial census of population and housing conducted by the Bureau of the Census, U.S. Department of Commerce. This resource was used to acquire data on population size, racial composition and housing status in the census tracts crossed or abutted by the various alternative alignments proposed for the Proposed Action. Additionally, the census mapping maintained by the Clark County Department of Comprehensive Planning's Advanced Demographics office was used in this study.

Inventory Results

Population Characteristics

The areas traversed by the proposed route are on the outer northeastern, eastern and southeastern periphery of metropolitan Las Vegas. This area is largely open desert and population densities are low. However, there are instances of some portions of the proposed route being located in areas of higher population density.

Clark County in general and Las Vegas in particular are among the most dynamic economic and social regions in the country. The county's population numbered 1.43 million in 2000, up 6.05 percent from 1999, and the CCDCP forecasts that the county population will exceed two million by the year 2012, despite a marked slowing in annual growth rates forecast for the coming decade (CCDCP, 2001). Total employment in July 2001 totaled 776,600, with 5.2 percent of the labor force unemployed. During 2000, the city was host to 35,849,691 visitors (CCDCP, 2001).

Eight census tracts are crossed or abutted by the proposed route, and their aggregate population in 2000 amounted to 28,701 persons. Table 3-8 lists the census tracts crossed by the proposed route by milepost. Details on the numbers and racial composition of the tracts' residents are presented in Table 3-9. As a generalization, population densities are higher in the southern portion of the route, where the transmission line passes near the incorporated areas of Henderson and Boulder City. Census tracts near the urban areas are somewhat smaller in size, reflecting the higher densities of population. Numbers of residents in these tracts typically run 4,000 or more. In contrast, along the northern and central portions, the census tracts are very large while the numbers of inhabitants are smaller.

Table 3-8 Census Tracks by Milepost

Milepost			
From	To	Miles (approx.)	Census Track
0.0	2.7	2.7	59.02
2.7	15.4	12.7	56.13
15.4	18.3	2.9	61.02
18.3	20.4	2.1	56.13
20.4	26.6	6.2	61.01
26.6	28.4	1.8	54.11
28.4	35.4	7.0	54.31

Milepost			
From	To	Miles (approx.)	Census Track
35.4	43.8	8.4	57.10
43.8	47.1	3.3	55.01
47.1	48.0	0.9	57.03
	Total	**48.0**	

Racially, the population along the proposed route is relatively diverse. Whites (not including Hispanics) accounted for 77.3 percent of the residents, while Hispanic/Latinos represented 12.3 percent. Hispanic or Latino includes persons declaring multiple racial backgrounds besides Hispanic/Latino, including White, Black/African American, Native American and Other. Black/African Americans accounted for 4.4 percent, Native Americans for 1.1 percent, with Asians and other races accounting for the balance of 4.9 percent (persons declaring specified race alone).

At the time of the census, there were 12,811 housing units in the nine census tracts, of which 2,027 (15.3 percent) were vacant (CCDCP, 2001).

Economic Characteristics

Clark County's economy is one of the more dynamic and robust in the country, with gaming and related visitor spending providing the dominant stimulus. With more than 35 million visitors per year, Las Vegas has the cash flow of a considerably larger metropolitan area.

Nevertheless, there are also major commercial and industrial operations in the region providing a firm base to the region's prosperity and welfare. With a favorable business climate to encourage investment, the jobs created by these industries are responsible for much of the region's population growth, which is largely the result of in-migration from neighboring states.

In April 2001, the Las Vegas Metropolitan Statistical Area (MSA) registered 785,400 civilian jobs. The MSA is comprised of Clark and Nye counties in Nevada and Mojave County in Arizona. Clark County accounts for more than 97 percent of the MSA's population, which amounted to 1,408,250 at the time of the 2000 census (CCDCP, 2001). The job distribution is described in Table 3-10, Las Vegas MSA Civilian Employment.

Of interest to this study is the relatively large size of construction sector employment, which accounts for nearly 10 percent of all jobs in the area. This situation favors recruitment of local resident construction workers for the Proposed Action, which would tend to reduce the need to bring in large numbers of non-local workers and alleviate demand for transient accommodations and services.

Table 3-9 Harry Allen–Mead 500kV Transmission Line Proposed Alignment: Year 2000 Census Data

POPULATION CHARACTERISTICS	Census Tract 54.11	Census Tract 54.31	Census Tract 55.01	Census Tract 56.13	Census Tract 57.03	Census Tract 57.10	Census Tract 59.02	Census Tract 61.01	Census Tract 61.02	Totals	Percent Distribution
Total:	4,865	4,353	4,365	4,165	2,702	2,774	1,525	2,055	3,952	**30,756**	**100.0%**
Not Hispanic or Latino:	4,303	3,940	4,227	3,803	2,314	2,630	1,014	1,920	2,946	**27,097**	**88.1%**
White alone	3,744	3,590	4,070	3,687	1,740	2,448	802	1,570	2,118	**23,769**	**77.3%**
% White alone	77.0%	82.5%	93.2%	88.5%	64.4%	88.2%	52.6%	76.4%	53.6%	**77.3%**	
% Non-White	23.0%	17.5%	6.8%	11.5%	35.6%	11.8%	47.4%	23.6%	46.4%	**22.7%**	
Black or African American alone	170	104	43	22	363	42	2	105	518	**1,369**	**4.5%**
American Indian and Alaska Native alone	38	31	26	21	16	11	155	11	14	**323**	**1.1%**
Asian alone	193	112	29	11	136	89	18	158	138	**884**	**2.9%**
Native Hawaiian and Other Pacific Islander alone	23	15	8	13	5	4	6	10	22	**106**	**0.3%**
Some other race alone	6	5	4	0	0	1	0	5	11	**32**	**0.1%**
Two or more races	129	83	47	49	54	35	31	61	125	**614**	**2.0%**
Hispanic or Latino:	562	413	138	362	388	144	511	135	1,006	**3,659**	**11.9%**
% Hispanic or Latino	11.6%	9.5%	3.2%	8.7%	14.4%	5.2%	33.5%	6.6%	25.5%	**11.9%**	
White alone	375	192	97	160	107	86	148	80	528	**1,773**	**5.8%**
Black or African American alone	3	6	3	3	4	0	1	0	12	**32**	**0.1%**
American Indian and Alaska Native alone	6	9	3	1	4	1	27	3	1	**55**	**0.2%**
Asian alone	6	2	0	0	1	1	0	0	3	**13**	**0.0%**
Native Hawaiian and Other Pacific Islander alone	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Some other race alone	140	161	34	169	81	47	329	40	375	**1,376**	**4.5%**
Two or more races	32	43	1	29	191	9	6	12	87	**410**	**1.3%**
HOUSING CHARACTERISTICS											
Total:	2,148	1,510	2,449	1,913	1,325	1,459	570	763	1,437	**13,574**	**100.0%**
Occupied	1,900	1,465	2,116	1,393	869	1,222	491	716	1,328	**11,500**	**84.7%**
Vacant	248	45	333	520	456	237	79	47	109	**2,074**	**15.3%**
% Vacant	11.5%	3.0%	13.6%	27.2%	34.4%	16.2%	13.9%	6.2%	7.6%	**15.3%**	

Source: U.S. Census Bureau, 2001

Table 3-10 Las Vegas MSA Civilian Employment April 2001

Industry Sector	Reported No. of Jobs	% Distribution
Mining	1,800	0.2 %
Construction	71,300	9.1 %
Manufacturing	25,000	3.2 %
Transport, Communication & Public Utilities	44,800	5.7 %
Wholesale Trade	24,300	3.1 %
Retail Trade	145,800	18.6 %
Finance, Insurance & Real Estate	37,300	4.7 %
Hotels, Gaming & Recreation Services	194,600	24.8 %
Other Services	155,400	19.8 %
Government	85,100	10.8 %
Total	785,400	100.0 %

Source: Clark County Department of Comprehensive Planning, 2001

Environmental Justice (Executive Order 12898 of February 11, 1997)

All Federal actions must address and identify as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority populations and low-income populations in the United States. The criteria for a finding of possible environmental justice problems is the occurrence of more than 50 percent of the population being minority or low-income in the proposed project area of influence. As discussed in the sections above, there are no occurrences of disproportionately high percentages of minority or low-income populations who might be impacted.

3.4.3 Health and Safety

Introduction

Electric and Magnetic Fields

The presence of high voltage transmission lines tends to increase public concerns about the safety of electric and magnetic fields (EMF). However, EMFs are present wherever electricity flows around appliances, in offices, schools, homes and power lines. Electric fields are invisible lines of force created by voltage and are shielded by most materials. Magnetic fields are invisible lines of force created by current and are not shielded by most materials, such as lead, soil and concrete. These fields are low-energy, extremely low frequency fields and should not be confused with high-energy or ionizing radiation such as X-rays and gamma rays.

Electric fields from high voltage transmission lines can produce small amounts of electric charge on nearby conductive objects, an action known as coupling or induction. Magnetic fields are produced primarily when induction impacts long and generally parallel objects (e.g., pipelines, railroads and fences) that have an electrical ground at some point of the object.

Electric field safety is addressed in the National Electric Safety Code. Federal standards do not exist for either environmental or occupational levels of power frequency magnetic fields.

Hazardous Materials

Hazardous materials or hazardous wastes are another source of concern. A hazardous materials inquiry was conducted along the study corridor to identify recognized environmental conditions that may exist.

Inventory Methods

The Proposed Alignment map (Map 1 in Appendix A) was used to identify the transmission lines, pipelines and railroads that parallel or cross the corridor.

Federal and state environmental incident databases, provided by VISTA Information Solutions (January 16, 2002), were reviewed to determine hazardous materials sites located within the proposed transmission line right-of-way.

Inventory Results

EMF Corridor Assessment

There are several operating power lines, pipelines and railroads in the plan area. Refer to Table 2-2 in Chapter 2 for a list of all potential transmission line and railroad crossings in the plan area. The Proposed Action would parallel existing transmission lines within an existing utility corridor for all but approximately eight miles of the route. Refer to Map 1: Proposed Alignment for the location of existing linear features in the plan area.

Electric and Magnetic Fields Indirect Exposure

The majority of human exposure to magnetic fields is generally from electronic appliances and wiring inside the home or office. As discussed above, power lines are also a source of electric and magnetic fields. Some epidemiological studies conducted in community settings have reported weak associations between childhood cancer and estimates of exposure to magnetic fields. More recent studies have concluded that magnetic fields do not themselves have the energy to directly cause cellular DNA damage that leads to leukemia or other cancers, nor does exposure to magnetic fields interfere with natural cell repair mechanisms (Lloyd, 2003).

Hazardous Materials Corridor Assessment

The VISTA report identified two Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) sites located near or within the proposed right-of-way: The Henderson Landfill and the Henderson Lead Contamination Soil Site. Both appear to be located on either side of the right-of-way east of Henderson, Nevada near mileposts 25.5 and 27. The Henderson Landfill is located approximately one mile west of the right-of-way. The Henderson Lead Contamination Soil site appears to be centered approximately one mile east of the site. According to the VISTA report, the last Federal action on the landfill site was in completed in 1993. The last action at the soil contamination site is reported as July 1992.

The Mead Substation (terminus for the Proposed Action) was listed in the VISTA report as a leaking underground storage tank (LUST) site. According to the report, there was a confirmed release of total petroleum hydrocarbons and solvents in February 1995. The LUST site at Mead Substation was reportedly closed.

No other properties expected to affect the construction or operation of the proposed transmission line or substations were identified during the course of the VISTA database review. A summary of the contents of the VISTA report is included in Appendix C.

3.4.4 Water Resources

Introduction

This section addresses the environmental baseline condition of water resources in the Harry Allen–Mead 500kV Transmission Line plan area. Descriptions of water resources in the plan area are included for surface waters (perennial and intermittent waterways), groundwater, wetlands and floodplains. Appendix A, Map 2: Biological Resources identifies water resources and wetlands relative to the plan area. Impacts are identified and discussed in Chapter 4. A discussion of the regulatory framework and inventory methods and results is provided below.

Regulatory Framework

Clark County, the EPA and the Nevada Division of Environmental Protection (NDEP) regulate water resources and water quality in the plan area. Applicable Federal, state and local water quality requirements are described in the following paragraphs.

Clark County

The plan area is located entirely within Clark County. The Clark County Board of Commissioners is designated as the area-wide water quality management planning organization within Clark County. Surface and groundwater quality in Clark County are under the jurisdiction of the Clark County Regional Flood Control District.

Activities conducted within the boundaries of the Clark County Wetlands Park would require a Conditional Use Permit issued by Clark County. The permit would specify the actions, conditions and mitigation measures required for conducting activities within the Wetlands Park.

Stormwater Pollution Prevention Plan

The Nevada Bureau of Water Pollution Control oversees and enforces Nevada's stormwater program. If construction activities for the Proposed Action were anticipated to discharge stormwater to waters of the U.S., Nevada Power would be required to obtain coverage under Nevada's Construction Stormwater General Permit as required by the National Pollutant Discharge Elimination System (NPDES) program authorized by the Federal Clean Water Act (CWA). The General Permit requires the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP), which must be prepared before construction begins.

Clean Water Act Section 404 Permits

Construction activities involving excavation or placement of fill material into waters of the U.S would required a permit under section 404 of the Clean Water Act from the U.S. Army Corps of Engineers (USACE). Excavation and fill activities required for the Proposed Action would be authorized under a Nationwide Permit (NWP) (McNure 2002). If required by the USACE, a mitigation and monitoring plan would be developed in coordination with the appropriate resource agencies and a final plan would by the USACE.

Inventory Methods

Existing data including previous studies, publications and maps were used to complete the water and related features inventory. Nevada Floodplains were identified from Federal Emergency Management Agency (FEMA) flood boundary digital maps. Several reports published by the Nevada Division of Water Planning were also used in identifying and characterizing the water resources and related features in the study corridor. Wetlands information was obtained from 1:250,000 scale National Wetlands Inventory (NWI) maps. Inventoried features were verified with aerial photography and site visits to inspect sensitive water features. A preliminary delineation of wetlands and Waters of the U.S. in the plan area was completed in March 2003 by Power Engineers, Inc.

Inventory Results

Surface Waters

The plan area transects four watersheds: the Las Vegas Wash, Lake Mead, Muddy River and Ivanpah-Pahrump Valley watersheds. A network of poorly defined, ephemeral washes characterizes these four arid watershed systems in the plan area.

The characteristically arid environment of southern Nevada results in the absence of naturally occurring perennial streams, lakes, reservoirs or ponds in the plan area. The Las Vegas Wash is the primary drainage for the plan area and the Las Vegas Valley. The Las Vegas Wash is fed by urban runoff, groundwater, treated wastewater, urban and agricultural irrigation and stormwater. Due to constant inflow of treated wastewater, the Las Vegas wash has become a perennial waterway with an average flow of 153 million gallons per day or 220 cubic feet per second (LVWCC, 2001).

There are many ephemeral washes present that support little or no riparian community. These washes carry stormwater as well as urban runoff in the plan area to the Las Vegas Wash and eventually Lake Mead, which is located to the east of the plan area.

Wetlands

No wetlands, as defined by the USACE, were identified in the Las Vegas Wash or elsewhere in the plan area.

The plan area transects approximately 0.4 miles of the Clark County Wetlands Park adjacent to the Las Vegas Wash. According to Clark County, all lands within the Park boundaries have been treated as wetlands (Jeff Harris, Clark County Parks, personal communication, January 11, 2002).

Floodplains

The Proposed Alignment would cross approximately 1.8 miles of FEMA-defined 100-year floodplains. The locations of 100-year floodplains in the plan area are identified on Map 2: Biological Resources in Appendix A.

3.4.5 Geology and Soils

Introduction

The following sections inventory the existing geology and soils of the plan area. An inventory of mining operations, mining claims and/or mineral rights are discussed in Section 3.4.1 Land Use.

Inventory Methods

Literature relevant to the assessment of the geology was reviewed and included information from the Nevada Bureau of Mines and Geology (NBMG), USGS, Clark County GIS Management Office (GISMO), Clark County Regional Flood Control District, Nevada Power, BLM, University of Nevada Reno and various county and city agencies. In addition, individuals from various agencies were interviewed to gain more information.

Soils data and related information were acquired from the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service, Southern Nevada Resource Area and from previous studies in the vicinity of the plan area. This information came in the form of two published soil surveys and additional unpublished maps, data and other information.

Inventory Results

Geology

The plan area lies within the southern margin of the Great Basin in the Basin and Range physiographic province characterized by a series of generally north-trending mountain ranges separated by alluviated valleys.

The northern and southern portions of the study area are underlain by unconsolidated Quaternary alluvium. This term applies to unconsolidated materials that differ widely in character and origin. The alluvium is present in a variety of forms including clay, silt and sand on the old flood plains composed of coarse, gravely deposits spread by sporadic sheet floods on wide slopes bordering high ranges; boulder deposits in alluvial fans built up by temporary streams that issue from narrow canyons; windblown sand forming irregular sheets or dunes; and heaps of coarse slide rock forming talus slopes below steep cliffs (Longwell, et al., 1965).

Mineral Development

The majority of the study area is designated as having low to moderate mineral potential except in areas designated as private lands or Lake Mead National Recreation area. The only mine identified in the plan area includes the PABCO Gypsum facility located in the

north-central portion of the plan area. PABCO mines rock gypsum and manufactures dry wall.

Soils

Soils found within the plan area fall into three broad descriptive categories: 1) deep, well drained soils on older flood plains, adjacent stream terraces and alluvial fans; 2) deep, well drained soils on recent alluvial fans, sand sheets and similar features; and 3) shallow soils on hills and mountains interspersed with rock land, rock outcrops and badland.

There are seven general soil map units within the plan area. Following is a brief description of these soil map units and associated erodibility.

- The Bard-Colorock-Tonopah group is comprised of deep soils on broad alluvial fans and old terraces. Erosion potential is low for water and ranges from very slight to moderate for wind.
- The Rock land–St. Thomas group consists of rock land and shallow soils on mountains and colluvial foothills. Erosion potential is low for water and very slight for wind. There would be little or no erosion potential for areas mapped as rock land.
- The Rock Outcrop-St. Thomas-Akela group consists of rock outcrops and shallow and very shallow soils on hills and mountains. Erosion potential is slight to low for water and from none to low for wind. There would be little or no erosion potential for areas mapped as rock outcrop.
- The Jean–Arizo group consists of very deep soils on recent alluvial fans. Erosion potential is low for water and ranges from slight to moderate for wind.
- The Bluepoint-Knob Hill group consists of very deep soils on sand sheets. Erosion potential is low for water and ranges from high to very high for wind.
- The Caliza-Aztec group consists of very deep soils on fan terraces. Erosion potential is slight to low for water and from very slight to high for wind.
- The Land-Spring group consists of very deep, salt-affected soils on alluvial fans. Erosion potential is low for water and high for wind.

3.4.6 Paleontological Resources

Introduction

The Division of Geological Sciences of the San Bernardino County Museum (SBCM) reviewed pertinent paleontology and geologic literature, consulted the locality records in the Regional Paleontologic Locality Inventory (RPLI) at the SBCM and conducted a field survey of the project corridor. The results of this study are detailed in a technical report, *Paleontologic Resources Assessment and Treatment Plan* (PRATP) on file with the BLM.

Literature research and institutional records searches resulted in the designation of high, low or undetermined paleontological sensitivity for all portions of the project area. Provisions to mitigate adverse impacts to significant nonrenewable paleontological

resources were based upon these determinations of potential paleontological sensitivity. Sedimentary units with high potential for containing significant paleontological resources are determined to have high paleontologic sensitivity. Rock units containing no or a very low density of fossil remains are determined to have low paleonotologic sensitivity. Poorly studied rock units, or ones that have limited exposure(s) in the project area but elsewhere contain fossil remains have an undetermined sensitivity. In some instances the undetermined sensitivity unit may overlie a high sensitivity unit.

The preservation of plant or animal remains as fossils is an extremely rare occurrence. Those of significant scientific interest provide data on the evolutionary relationships and developmental trends among organisms; provide data useful in determining the age(s) of the rock unit, informing on the depositional history of a region and timing of geologic events; provide data on the development of biological communities or interaction between paleobotanical and paleozoological biotas; demonstrate unusual or spectacular circumstance in the history of life; and/or are in short supply or have a limited distribution and risk being destroyed by natural elements, vandalism or commercial developments or exploitation.

Paleontological Resources Inventory Methods

The SBCM conducted an assessment of the paleontologic sensitivity of rock units exposed throughout the proposed project corridor. The corridor crosses through two areas of long-standing geological interest, the Rainbow Garden Geologic Preserve and the BLM Sunrise Management Area (refer to Map 1 in Appendix A). The assessment included review of pertinent paleontologic and geologic literature, a check of locality records, and a field survey of the proposed transmission line corridor and its associated stations and access roads to identify surface outcrops and exposed fossil resources within the APE. The study was conducted under the direction of Kathleen B. Springer, Senior Curator of Geological Sciences for the SBCM and under Scientific Paleontological Collecting Permit No. N-75218, issued by the Nevada BLM to the SBCM.

The project area was covered at a Class III level of inventory. The corridor surveyed was 200 feet wide on average, with an additional 100-foot buffer on either side, although this width varied somewhat along the length of the alignment. Two pedestrian transects were traversed, one on either side of the centerline, spaced approximately 30 meters from each other and approximately 15 meters from the centerline. The corridor was surveyed by a field crew of five members, generally working in teams of two individuals each, along the entire length of the transmission line. Significant fossil resources were documented when encountered. The stratigraphy, lithology and geomorphology of fossil-bearing sediments, and contextual data from the fossils themselves, including taphonomic data, were recorded where appropriate.

The potential for cave openings in limestone rocks was also assessed. Paleozoic limestone outcrops were examined not only to confirm the presence of time-diagnostic invertebrate remains that might be present, but also to seek evidence of fissures or surface cracks that might lead to subsurface cave deposits potentially containing remains of Pleistocene and/or early Holocene fossils.

Finally, the presence of wood rat (*Neotoma*) middens in the corridor was also evaluated. Middens have been previously employed to track climatic shifts and changes in plant

distribution in the Great Basin and the Mojave Desert throughout the later part of the Pleistocene Epoch (± 40,000 years before present [BP] to ± 11,000 years BP), as well as through much of the Holocene Epoch (< 11,000 years BP) and so have high paleontologic sensitivity.

The field survey was implemented to clearly and distinctly delineate the various exposed and subsurface geologic formations on site, while determining if paleontologic resources were present. When present, their potential significance was assessed. As fossils were encountered, their exact location was recorded using handheld Global Positioning System (GPS) transceivers, and the presence of the fossils was documented in field notes with preliminary field identifications. No fossils were collected during the field survey.

The primary focus of the survey was to identify paleontologically sensitive sedimentary exposures present within the proposed project corridor and to target significant paleontologic resources requiring preservation in advance of construction-related excavation. This focus ensured that resources would be preserved from adverse impacts so that the data provided by the resource(s) would not be lost to science. The field reconnaissance was further structured to address specific research concerns, if at all possible; although, the fact that resource recovery was deferred until a later time limited the amount of information gleaned from identified sites.

Paleontological Resources Inventory Results

The field reconnaissance resulted in the identification of 19 previously unrecorded paleontologic resource localities. All of these localities were identified from surface exposures. These localities were recorded from exposures of the Callville Limestone (late Mississippian Period, through Pennsylvanian Period, to early Permian Period), the Kaibab Formation (middle Permian Period), the Thumb Member of the Horse Spring Formation (Miocene Epoch) and the Muddy Creek Formation (later Miocene and early Pliocene Epochs). All paleontologic localities are sited on lands administered by the BLM.

Beyond these 19 previously undocumented localities, Gypsum Cave is located within the project study corridor. This locality was quite thoroughly excavated in the 1930s and yielded fossil remains of extinct Pleistocene megafauna, including Shasta ground sloth (*Nothrotheriops shastensis*), large and small horse (*Equus* spp., including a small hemionine or "stilt-legged" species), llama (*Hemiauchenia*), llama-like giant camel (*Camelops*) and sheep (*Ovis canadensis*). These fossils date to the latest Pleistocene Epoch; a radiocarbon date of 11,690 ± 250 years BP was obtained from a dung sample from the cave. Gypsum Cave is the first site in southern Nevada to yield fossils of extinct ground sloth.

Unlike other regional solution caves, however, the shelter provided by Gypsum Cave and the extreme aridity of the region have resulted in an excellent degree of preservation. Gypsum Cave has yielded extremely rare mummified remains of extinct Pleistocene animals, most notably the Shasta ground sloth. Hide, hair, bones and extensive dung of these extinct sloths have all been recovered from Gypsum Cave. These remains are unique paleontologic treasures, for they provide a wealth of data that skeletons alone cannot. Much of what is currently known about the appearance and dietary habits of the extinct Shasta ground sloth has been gleaned from the spectacular fossils recovered from

Gypsum Cave. The fossils recovered in the 1930s from Gypsum Cave are now housed at the Natural History Museum of Los Angeles, and their study is ongoing.

Locality data have been entered into the RPLI at the SBCM under locality numbers SBCM 2.11.67 through SBCM 2.11.84 and SBCM 2.7.1-2.7.2. The information recorded in the RPLI is presented in a technical study prepared by the SBCM (January 2004). Preliminary fossil identifications based upon field examination consist of 11 wood rat middens; six ripple mark and/or bird (Aves) trackways, all in the Thumb Member of the Horse Spring Formation; one plant or wood impression in the Thumb Member of the Horse Spring Formation; and one location with an Ostracoda shell, in addition to the fossil assemblage at Gypsum Cave. Resource recovery, laboratory preparation and professional identification will provide more precise taxonomic assignments for many of these fossils.